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Volume I

PEIS UPGRADE DATA REPORT ON PLUTONIUM STORAGE AT THE SAVANNAH RIVER SITE

The Data is in support of the Upgrade Alternative
for
The United States Department of Energy
to support the
Programmatic-Environmental Impact Statement
for
Storage and Disposition of Weapons-Usable Fissile Material

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Volume I

This Document is part of a

Four Volume Series:

VOLUME I - DATA REPORT (including Summary & Environmental Data)

VOLUME II - COST ESTIMATE

VOLUME III - SUPPORTING DOCUMENTATION

VOLUME IV - UCNI SUPPORTING DOCUMENTATION

DATA REPORT

on

Plutonium Storage

at

Savannah River Site

To support the Nuclear Weapons Complex Dispositioning Program Programmatic Environmental Impact Statement.

Issue Approvals

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ACRONYMS & ABBREVIATIONS

AGV	Automatic Guided Vehicle
ALARA	As low as reasonably achievable
AM	Accountability Measurements
ANSI	American National Standards Institute
APH	Abnormal Package Handling
BTC	Bagless Transfer Container
CAM	Continuous Air Monitor
CAS	Central Alarm Station
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
CM	Confirmatory Measurement
CRT	Cargo Restraint Transport
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DBF	Design Basis Fire
DBFL	Design Basis Flood
DBT	Design Basis Tornado
DBW	Design Basis Wind
DOE	(U.S.) Department of Energy
DP	Defense Program
D&R	Dismantle and Remove
EDE	Effective Dose Equivalent
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ES&H	Environmental, Safety, and Health
ESF	Engineered Storage Fixture
FDI	Fluor Daniel, Inc.
HEPA	High-efficiency Particulate Air
HP	Health Physics
HVAC	Heating, Ventilating, and Air Conditioning
HW	Hazardous Waste
I/O	Input/Output
IAEA	International Atomic Energy Agency
ISTV	Intrasite Transfer Vehicle
LA	Limited Area
MC	Material Confirmation
NDA	Non-Destructive Assay
NDE	Non-Destructive Examination
PCV	Primary Containment Vessel

ACRONYMS & ABBREVIATIONS

PIDAS	Perimeter Intrusion Detection and Assessment System
PSF	Plutonium Storage Facility
ROD	Record of Decision
SGT	Safeguard Transport
ShPs	Shipping Packages
SPS	Shipping Package Storage
SPU	Shipping Package Unpackaging/Packaging
SST	Safe Secure Transport
SV	Storage Vault
TID	Tamper Indicating Device
TU	Truck Unloading

GLOSSARY

Acceptance criteria: Criteria for the quality and stability of materials received at the Pu Storage Facility for long-term storage that the donor sites are responsible for meeting.

As low as reasonably achievable (ALARA): An approach to radiation protection to control or manage exposures (both individual and collective to the workforce and general public) as low as social, technical, economic, practical, and public policy considerations permit. As used in DOE 5480.11, ALARA is not a dose limit but a philosophy of design and operation process, which has the objective of dose levels as far below applicable limits of the Order as reasonably achievable.

Assay: A measurement that establishes the total quantity of nuclear material present in the items being measured; the measurement may establish the total element or total isotopic weight of the nuclear materials.

Attribute measurement: The measurement of some property of population of items based on whether or not the items in a sample of the population do or do not possess a given characteristic, or "attribute" (e.g., emit gamma rays).

Bagless transfer container: A can (used to contain plutonium metal or plutonium oxide) that will be placed directly into the primary containment vessel as an option for a boundary container. The requirements for this can include: corrosion resistant, hermetically sealed, and free of transferable contamination.

Boundary container: The can (for plutonium metal or plutonium oxide) that will be placed into the primary containment vessel. This container may either be a bagless transfer can or other container that meets the following requirements: corrosion resistant, hermetically sealed, and free of transferable contamination.

GLOSSARY

Cargo Restraint Transport (CRT): A specially designed container that holds up to eight shipping packages of material to be stored in the Pu Storage Facility. The CRTs restrict movement and prevent damage to the shipping packages while in transit by Safe Secure Trailer (SST) or Safeguard Transport (SGT), and during loading and unloading operations.

Combustible: Material that will sustain combustion in a normal air atmosphere.

Confinement: A barrier to prevent undesirable passage of a given material.

Confinement area: An area having structures or systems from which releases of hazardous materials are controlled. The primary confinement systems are the process enclosures (gloveboxes, hoods, conveyors, transfer boxes, other spaces normally containing hazardous materials), which are surrounded by one or more secondary confinement areas (operating area compartments). (DOE 6430.1A)

Confinement measurement: Made to test whether some attribute of nuclear material is consistent with the expected response for that material if no significant change has occurred. The measurement may be a go/no-go, qualitative, semiquantitative, or verification measurement.

Containment: Fully enclosed to retain contents in normal and possibly accident conditions.

Crush resistant: Items that are expected to survive or containers that are not expected to be breached if dropped from the maximum transport elevation or if impacted by an object of similar shape and mass dropped from the same height.

Decommissioning: The process of closing and securing a nuclear facility, or nuclear materials storage facility so as to provide adequate protection from radiation exposure and to isolate radioactive contamination from the human environment. (DOE 6430.1A)

GLOSSARY

Design Basis Tornado (DBT): The design tornado applicable to the performance category of the facility under consideration at that specific site. Safety class items are designed to remain functional during and after this design tornado. (Adapted from DOE 6430.1A)

Design Basis Wind (DBW): The design wind applicable to the performance category of the facility under consideration at that specific site. Safety class items are designed to remain functional during and after this design wind.

Effective Dose Equivalent (EDE): The dose equivalent from both external and internal irradiation defined by $E_T W_T \times H_T$ where H_T is the dose equivalent in tissue T and W_T is the weighting factor representing the ratio of the risk arising from irradiation of tissue T to the total risk when the whole body is irradiated uniformly. The EDE is expressed in units of rem. For the purposes of this report, the internal radiation dose is that which would be received over the succeeding 50-year period. (Adapted from DOE 6430.1A).

Emergency power: DBA-qualified, fully redundant power generation, switching, and distribution system that meets the IEEE 379, IEEE 384, and safety class criteria in Division 16, Electrical. It is designed to activate on loss of the normal power supply (or in the case of UPS systems, be on-line) and is used to supply safety class items with power to allow them to maintain their safety class functions or other essential elements. (Adapted from DOE 6430.1A).

Emergency power systems: The auxiliary power systems that provide power to safety and security related equipment during periods of partial or total power failure of associated primary power system. (Adapted from DOE 6430.1A).

Enclosure: A compartment that functions as a physical barrier, with continuous limited boundaries, to prevent the release of radioactive and hazardous materials to the environment through the use of ventilation and control systems. Examples are gloveboxes, hoods, canyons, hot cells, and tunnels. (Adapted from DOE 6430.1A).

GLOSSARY

Facility: For the purpose of this document, "Facility" encompasses all of the buildings, systems, equipment, operations, and functions within the site boundaries, including site development features such as landscaping, roads, walks, and parking areas, outside lighting and communication systems, central utility plants, utilities supply and distribution systems, and other physical plant features, that are associated with the main function (e.g., Material Storage). It does not include other non-associated functions that are collocated on the same site.

Low-Level Waste (LLW): Radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material, as defined by DOE 5820.2A. (DOE 6430.1A) Low-Level Waste radionuclide concentrations are below 100 nCi/g.

Material Access Area (MAA): An area that contains a Category I quantity of SNM and is specifically defined by physical barriers, located within a protected area, and subject to specific access controls. (DOE 6430.1A)

Material accountability: The use of measurements, analyses, records, and reports to maintain knowledge of the quantities of nuclear materials present in each accountability area of a facility and the use of physical inventories and material balances to verify the presence of materials or to detect loss of materials after it occurs. It consists of item and bulk material accountability.

Material Balance Area (MBA): A subsidiary account of the facility designed to establish accountability and to localize inventory differences. It is an identifiable physical area wherein the quantity of nuclear material being moved into or out is represented by a measured value. (Adapted from DOE 6430.1A)

Material Control and Accountability (MC&A): That part of safeguards that detects or deters theft or diversion and provides assurance that all nuclear materials are present.

Measurement control: Consists of procedures and activities used to ensure that a measurement process generates measurements of sufficient quality for their intended use.

GLOSSARY

Nondestructive assay: A measurement of materials without altering their chemical or physical form.

Nuclear materials accountability: That part of a safeguards program encompassing the procedures and systems to (a) perform nuclear materials measurements, (b) verify the location and quantities of nuclear material through physical inventories, (c) maintain records and provide reports, (d) perform data analysis to account for nuclear material and to detect losses, and (e) help investigate and resolve apparent losses of nuclear material.

Nuclear materials control: that part of the safeguards program encompassing management and process controls to (a) assign and exercise responsibility for nuclear material, (b) maintain vigilance over the material, (c) govern its movement, (d) monitor the inventory and process status, detect unauthorized activities for all nuclear material, and (e) help investigate and resolve apparent losses of nuclear material.

Off-normal: Refers to shipping packages, secondary containers, primary containment vessels, or boundary containers which do not meet acceptance criteria or are suspect condition.

Operating Basis Accident (OBA): Maximum severity accident under which the plant structure, systems, and components are designed to either remain operable or be readily restored to operating condition. (Adapted from DOE 6430.1A)

Overpack: All packaging material including shielding, insulation, drum, etc., which are outside high integrity primary and secondary containment as provided.

Performance Category (PC): Categories defined in DOE-STD-1020-92 which are used to determine design requirements and for evaluation of DOE facilities to survive natural phenomena events. These categories reflect the importance of the facility as to occupant and public safety, continued function, and assurance needed for containment of hazardous materials. (Adapted from DOE 6430.1A) (this definition references a more current DOE standard.)

GLOSSARY

Physical inventory: (a) determines the quantity of material on hand by physically ascertaining its presence using techniques which include sampling, weighing, and analysis, and (b) identifies, physically locates, and determines accountability values for nuclear material on hand in accordance with a predetermined schedule.

Preaction Sprinkler System: A sprinkler system employing automatic sprinklers attached to a piping system containing air that may or may not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers. Actuation of the detection system opens a valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that are open.

Primary Containment Vessel: The storage container that provides the outer containment boundary for long-term storage of pits and non-pits in a noncontaminated area. In the case of pits, the primary containment vessel is the AT-400A.

Product container (material): The inner container that is in contact with the stored product (plutonium metal or plutonium oxide.) This may either be the boundary container, or a container that resides inside the boundary container. The product container will be free of all organic material such as plastic bags, organic coatings, or gaskets.

Property Protected Area (PPA): An area for controlling public access to the plant property, but does not contain classified information or SNM.

Protected area (PA): An area for controlling Category I and II quantities of SNM.

Power grade plutonium: This grade of plutonium has an isotopic weight percent concentration of ^{240}Pu which is greater than 19%. For purposes of scoping its thermal power and radiation emission characteristics, the following two representative power-grade plutonium isotopic percent concentration compositions have been defined: 1.1 ^{238}Pu, 62.0 ^{239}Pu, 22.0 ^{240}Pu, 12.0 ^{241}Pu, and 3.0 ^{242}Pu; and 3.5 ^{239}Pu, 26.4 ^{238}Pu, 16.0 ^{241}Pu, and 9.1 ^{242}Pu.

Rem: A unit of dose equivalent that is the product of absorbed dose (D) in rads in tissue, a quality factor (Q), and other modifying factors (N). Derived from roentgen equivalent man. (DOE 6430.1A)

Residue: Excess process material or scrap from a manufacturing or purification generation which contains sufficient plutonium to not be classified as waste.

Safe Secure Trailer (SST): A specially designed semi-trailer that has a protective and deterrent system that is used with a special tractor to transport nuclear explosive or Special Nuclear Material (SNM).

Safeguards: An integrated system of physical protection, material accounting, and material control measures designed to deter, prevent, detect, and respond to unauthorized possession, use, or sabotage of SNM. In practice, safeguards involve the development and application of techniques and procedures dealing with the establishment and continued maintenance of a system of activities including physical protection, quantitative knowledge of the location and use of SNMs, and administrative controls surveillance to assure that procedures and techniques of the system are effective and are being carried out. Safeguards include the timely indication of possible diversion or credible assurances by audits and inventory verification that no diversion has occurred. (DOE 6430.1A)

Safeguard transport (SGT): A specially designed semi-trailer that has a protective and deterrent system that is used with a special tractor to transport nuclear explosive or Special Nuclear Material (SNM).

Sanitary landfill: A system for disposal of garbage, trash, and other rubbish from domestic sources in compacted layers covered with soil to a depth sufficient to exclude rats, flies, and other vectors. Most sites provide for leachate control. (DOE 6430.1A)

Secondary (boundary) container: A high integrity container for transportation in which non-pit primary containment vessels are placed. Secondary containers have threaded or bolted lids.

Shall: Denotes a requirement. (DOE 6430.1A)

Shipping package: The assembly of components necessary to ensure compliance with Federal packaging requirements.

Special Nuclear Material (SNM): Plutonium, uranium-233, uranium enriched in the isotope 235, and any other material that pursuant to the provisions of Section 51 of the Atomic Energy Act of 1954, as amended, has been determined to be special nuclear material, but does not include source material; it also includes any material artificially enriched by any of the foregoing, not including source material. (DOE 5633.3A)

Standby power: A reserve power generation or supply with switching devices that will supply power to selected loads in the event of a normal power-failure. It is not required to have redundant equipment or to operate through events greater than UBC. A standby power system shall not be classified safety class. (DOE 6430.1A)

Strategic reserve material: Plutonium or other SNM material that is reserved for nuclear weapons. Refers to inventory of DOE owned SNM. Quantity is determined by the Nuclear Weapons Council.

Structures, Systems, and Components (SSCs):

(1) **Structure:** Is an element, or a collection of elements to provide support or enclosure such as a building, free standing tank, basins, dikes, or stacks.

(2) **System:** Is a collection of components assembled to perform a function such as piping, cable trays, conduits, or HVAC.

(3) **Component:** Is an item of equipment such as a pump, valve or relay, or an element of a larger array such as a length of pipe, elbow, or reducer. (DOE 6430.1A)

Surplus material: Refers to inventory of DOE owned SNM determined to be in excess of defense needs that has been released from the Nuclear Weapons Program. Quantity is determined by the Nuclear Weapons council. Existence of Surplus Material is a result of recent nuclear arms reduction agreements and pledges. Materials declared as excess will be placed under a voluntary program of international verification and inspection.

GLOSSARY

Tamper Indicating Device (TID): Device used on a container to reveal a violation of the container's integrity.

TRU waste: Without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with alpha-emitting TRU radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/ag. (DOE 6430.1A) Regarding the Waste Isolation Pilot Plant, high-level waste and spent nuclear fuel as defined by DOE 5820.2A are specifically excluded by this definition.

Uninterruptible Power Supply (UPS): A power supply that provides automatic, and nearly instantaneous power, without delay or transients, on failure of normal power. It can consist of batteries or full-time operating generators. It can be designated as standby or emergency power depending on the application. Emergency installations must meet the requirements specified for emergency power. (DOE 6430.1A)

Verification measurement: A quantitative remeasurement to verify an existing measured value as previously recorded.

Weapons grade plutonium: This grade of plutonium has an isotopic weight percent concentration of ^{240}Pu which is nominally 6%. For Purposes of scoping its thermal power and radiation emission characteristics, DOE/DP has defined a nominal weapons-grade plutonium as having the following isotopic percent concentration composition: 0.01 ^{238}Pu, 93.0 ^{239}Pu, 6.0 ^{240}Pu, 0.75 ^{241}Pu, and 0.01 ^{242}Pu.

SCOPE

Two related events have combined to create an unprecedented condition in the history of the nuclear weapons programs. The first event is the cessation of the production of nuclear weapons and most nuclear weapons components by the Department of Energy (DOE). The second event is a significant scheduled reduction in the military nuclear weapons stockpile. The condition resulting from these two governmental actions is a large surplus of weapons-grade plutonium. Storage of this plutonium in a safe, secure manner for decades is the challenge facing the DOE.

Prior to these events, most plutonium was either located in the military stockpile or in interim storage at eight DOE-owned facilities, or was undergoing processing or fabrication. During the reduction of the weapons stockpile, DOE plans to dismantle the weapons and place the plutonium in interim storage at the Pantex Plant. DOE's long-term plans include selecting and developing an ultimate disposition method for the surplus plutonium. It is expected to take several years to select a method and begin disposing of the surplus plutonium, and several decades to dispose of all the plutonium currently in interim storage at DOE facilities. Prior to disposal, the surplus plutonium will need to be stored.

Alternatives

Congress must decide where the nation's plutonium will be stored and the combination of new and existing facilities that will be used. The goal is to provide the best long-term storage solution based on initial capital cost, the total life cycle costs and socioeconomic impacts. The Programmatic Environmental Impact Statement/Record of Decision (PEIS/ROD) process will be used to select an alternative.

There are three types of alternatives under consideration for the storage of DOE plutonium:

a. "No action" - Under this alternative, existing storage facilities would continue to store plutonium. No significant changes would be incorporated into existing facilities or storage methods. This alternative may not comply with the long-term storage requirements.

SCOPE
(continued)

b. "Upgrade" - Under this alternative, plutonium would continue to be stored at some or all of the existing storage locations. The facilities and storage methods would be upgraded and/or modified to satisfy the long-term storage criteria and all Federal, State, and local Environmental Safety and Health (ES&H) regulatory requirements.

c. "Consolidated" - Under this alternative, all the plutonium would be stored at a new storage plant. Plutonium storage in existing storage facilities would be phased-out.

The data presented in the report outlines conditions as they exist today in the areas of interest - (i.e. F-Area Plutonium Production and Storage Facilities). Once F-Area deinventory is completed and the facilities are transferred to standby mode around FY2000, SNM materials would be available for consolidation in one location.

This issue of the PEIS Data Report, Revision 3, includes additional information on the two Options selected as the bounding case under the Upgrade Alternative. Specifically, Option 1 - New Plutonium Storage Facility and Option 3 - 235-F Upgrade. Information in this revision on Option 2 - P-Area Assembly Area Upgrade appears in its original form.

1.0 MISSIONS AND ASSUMPTIONS

1.1 MISSIONS

Missions under this Data Call are defined as follows:

a. No-Action: Under this alternative, existing storage facilities would continue to store plutonium. No significant changes would be incorporated into existing facilities or storage methods. This alternative may not comply with long term storage requirements.

b. Upgrade: Under this alternative, plutonium would continue to be stored at some or all of the existing storage locations. The facilities and storage methods would be upgraded and/or modified to satisfy the long-term storage criteria and all Federal, State, and local Environmental Safety and Health (ES&H) regulatory requirements.

This report will focus on the Upgrade Alternative as designated as item (b) above. Environmental data for item (a) was forwarded in a separate report. (Doc. #ESH-NEP-930/88 Rev. 1 dated 10/18/93)

1.1.1 NUCLEAR MATERIALS PROCESSING

The Nuclear Material Processing Division of WSRC has responsibility for plutonium recovery operations. SRS Facilities for the processing and storage of plutonium are located in F Area.

The primary mission of the F-Area Facilities to FY2000 will be to deinventory nuclear materials not yet processed, reprocess any stored materials which do not meet long term acceptance criteria, place operating facilities in the standby mode, and provide an acceptable storage location for the Special Nuclear Material (SNM) product until a long term storage facility can be built.

1.1.1 NUCLEAR MATERIALS PROCESSING (continued)

Existing storage vaults available in F Area can provide safe and adequate capacity in the interim until a new consolidated vault can be built for a 50 year storage life.

Other NEPA Activities which could affect stabilization and deinventory plans are the Record of Decision (ROD) for the Environmental Impact Statement on the Interim Management of Nuclear Materials at SRS (IMNM EIS) (expected in March 95), the Programmatic EIS for Spent Fuel Management (with a ROD expected in June 1995), the EIS for Foreign Research Reactor spent fuels (ROD expected in December 1995), and site-specific EIS efforts that would be concluded after the Disposition Programmatic EIS is completed.

Justification for the selection of Plutonium Storage Options is provided in Section 3.0.

1.1.2 NMPD GOALS AND OBJECTIVES

The primary goals and objectives required for an orderly transition to standby status of plutonium processing in F Canyon, FB Line, and associated facilities are:

1) Stabilize by conversion to metal or oxide all in-canyon inventories of plutonium and convert the uranium solution to oxide.

2) Process residues such as scrub alloy, sweepings, reduction residues, etc. that require aqueous processing for stabilization.

3) Process existing SRS inventories of aluminum clad targets and offsite aluminum clad plutonium rich bearing fuels.

4) Transfer compatible F-Area processing feedstocks to H Area to minimize F-Area deinventory time.

5) Complete cleanout, flushing and chemicals/hazardous materials disposal to a level satisfactory for maintaining facilities in a safe, stable configuration.

1.1.2 OVERALL GOALS AND OBJECTIVES (continued)

6) Deactivate and isolate facilities and systems that are not required in standby mode to minimize resources and risk.

7) Implement standby surveillance and maintenance program.

8) Maintain the safe storage and management of SNM materials.

1.2.3 COMPLIANCE - RULES, REGULATIONS, CODES, AND GUIDELINES (continued)

The PDC requires that the facilities comply with all applicable federal, state, and local laws and regulations, as well as the appropriate industry consensus codes and standards.

b. Existing shared support facilities shall not be required to comply with the PDC where:

- The facilities do not require modification or expansion to support SNM storage operations, and
- Three quarters (75%) of the output from the facilities supports non-SNM storage operations.

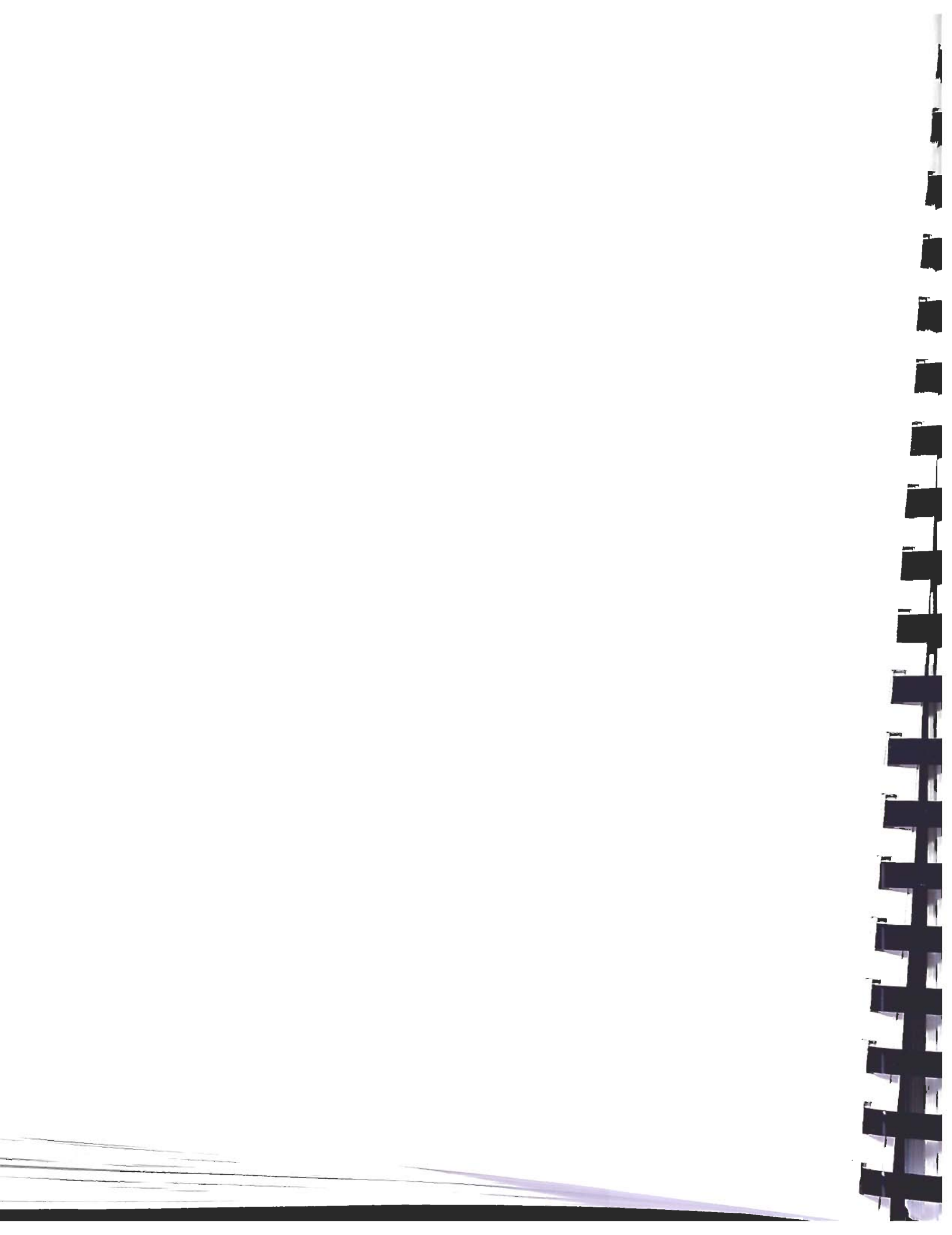
c. If any part of a building or facility requires compliance with the PDC, the entire building or facility shall be upgraded to comply with the PDC criteria.

d. Any proposed exceptions to the PDC shall be documented, and submitted to DOE for resolution and/or approval as soon as possible. Documentation shall include a description of why the PDC criteria can not be met, what criteria can be met, and what are the consequences of not meeting the requirements or how the requirements will be met by other means.

e. Facilities that were under construction by July of 1993 are assumed to be existing. Construction started after July of 1993 shall be considered as part of the Upgrade Alternative. The SNM Consolidation Project at the Rocky Flats Plant is an exception to this requirement.

f. Existing facilities that are required to comply with the PDC shall not use paragraph 3, Section 0101-1 of 6430.1A to exempt these facilities from complying with the 6430.1A requirements.

g. Upgrades shall comply with the Americans With Disabilities Act of 1990 (ADA), which is a Civil Rights Law that guarantees unprecedented accessibility to facilities and programs for people with disabilities.



1.2.4 ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) continued)

e. The use of carcinogens shall be minimized or eliminated, where possible.

ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) - WASTE MANAGEMENT

a. Generation of all wastes shall be minimized subject to the constraints of ALARA.

b. Low level mixed wastes shall be stored in a long-term storage building at an approved site. If on-site storage is selected, the storage facility will be sized to support three years of interim storage of low level mixed wastes. Space will be provided for facilities to store low level mixed wastes generated during the 50-year life if the storage facility.

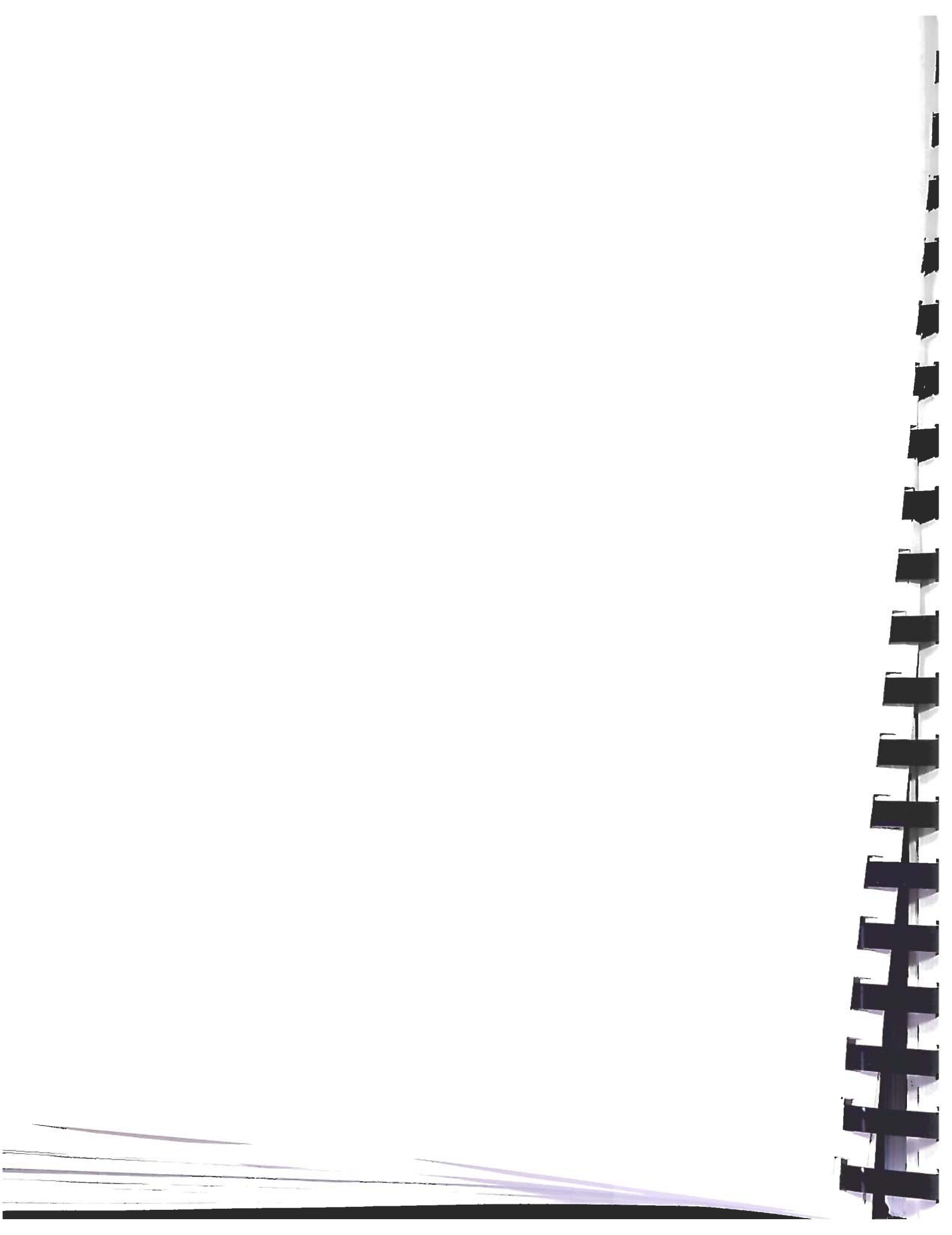
c. All liquid and particulate LLW shall be immobilized before disposal. LLW shall be disposed at an approved site.

d. Transuranic (TRU) waste shall be stored on an interim basis and then shipped to an approved site. TRU waste is generated only by Plutonium operations.

e. Hazardous waste, sanitary wastewater, and sanitary and industrial solid waste may be treated in the same manner as is the current practice at the site, as long as it complies with the PDC.

f. All fire sprinkler water discharged in process areas shall be contained and treated as process wastewater, when required.

g. Storm water management system shall be designed to reduce pollutant discharges, to the maximum extent practicable, through the site management practices, control techniques and systems, design and engineering methods, and other appropriate methods.



1.2.6 Pu STORAGE FACILITIES (continued)

k. A list of all facilities supporting the Upgrade shall be provided. The following data shall be provided for all facilities that are required to comply with the PDC: functional descriptions, structure footprints, gross area requirements, construction types (e.g. concrete or steel), and security access locations (i.e. PPA, LA, PA, and MAA).

l. The vault will be used for storage of plutonium-239 materials primarily. Other isotopes, such as neptunium-237 and plutonium 238, may also be stored at the facility. However, special acceptance criteria and containers design for the isotopes has not been developed to date.

m. The new vault will not be equipped to store site standards and sources.

n. The Plutonium Storage Facility will normally operate on a 5 day per week, 8 hour shift for shipping and receiving. Storage, security, and utility operations are required 24 hours a day.

o. Each stored container will generate up to 15 watts of heat. The H&V System for the vaults should be designed to maintain a maximum vault temperature of 100°F.

2.0 PLANT AND FACILITY DESCRIPTIONS

2.1 SITE GENERAL

The Savannah River Site (SRS) occupies about 300 square miles in Aiken, Barnwell, and Allendale counties on the upper Atlantic Coastal Plain of South Carolina. The Savannah River Site is approximately 25 miles southeast of Augusta, Georgia; 22 miles south of Aiken, South Carolina; and 100 miles from the Atlantic coast (Figure 2-1). The site is operated for DOE by Westinghouse Savannah River Company, the primary contractor at SRS. The F-Canyon facilities, FB-Line, and associated facilities where plutonium-239 is recovered and stored are located in 200 F Area near the center of SRS. Tritium facilities are located in 200 H Area. SRS is owned by the United States Department of Energy (DOE).

2.2 F-AREA PROCESSING FACILITIES

F Area contains processing facilities designed primarily for recovery of plutonium-239 from irradiated or unirradiated feed materials. Major facilities, as shown on plot plan Figure 2-2, consist of 221-F Canyon, for dissolution and purification and FB Line for conversion to metal or oxide as desired. Two new facilities, New Special Recovery (NSR) and Plutonium Storage Facility (PSF), are complete, but were not put in operation. Both facilities are in cold standby status awaiting DOE startup approval. NSR may provide additional scrap dissolution capacity when required. PSF and the building 247-F vault could be started if required to provide additional interim storage capacity during the de-inventory period.

The current mission of F Area is to transition the nuclear material processing facilities at SRS from a production mode through decommissioning, maintaining a nuclear material production competency, until the facilities are de-inventoried, and then begin terminal cleanout of those facilities while maintaining storage and accountability of SNM at Savannah River Site. A listing of the major facilities located in the F-Area Separations Facilities is shown in Table 2-1. A brief description of each facility's function is provided in the following sections.

TABLE 2-1
EXISTING FACILITY DATA
F-AREA

BLDG. NO.	FACILITY NAME	FOOTPRINT (SQ. FT.)	NO. OF LEVELS	CONSTRUCTION
211-F	Outside Facilities	N/A		Supply Tanks/ Metal Frame Bldgs.
221-F	F-Canyon	376,600	4-6	Concrete
235-F	Pu FF & Actinide Billet Lines	23,986	2	Concrete
241-F series	Tank Farm	N/A	-	Bermed Tank Farm for Waste
246-F	Equip. Dev. (1) Facility	13,660	3	Metal Frame
247-F	Naval Fuels	140,000	2	Concrete & Metal Frame
251-F	Primary Sub Sta.(1)	1,923	-	Outside
292-F	Canyon Exh.Fan House	12,482	1	Concrete
294-F&1F&2F	Sand Filters	24,000 36,000 10,080		Concrete
701-1F	Guard House (1)	6,080	1	Metal Frame
703-F	Admin. Bldg.	20,000	1	Metal Frame
704-F	Admin. Bldg.	12,141	1	Metal Frame
707-7F	Admin. Bldg. (1)	16,000	1	Metal Frame
707-F	Admin. Bldg. (1)	16,000	1	Metal Frame
709-F	Fire Station (1)	2,075	1	Metal Frame
717-F	Mock-up Shop - (1) Area Maint. Shops	27,640	2	Metal Frame
723-F	Laundry (1)	11,421	1	Metal Frame
772-F & 1F	Contol Lab. (1)	41,479 3009	2	Concrete & Metal Frame

(1) To be used to support the proposed Consolidated Plutonium Storage Facility. All Facilities used less than 25% of capacity for Upgrade Alternative activities.

2.2.1 221-F CANYON

The 221-F Canyon facility was completed in 1954 with the primary mission for recovery of reactor targets for production of new plutonium. It has both remote and manual operations consisting of a warm canyon, hot canyon, and center section for control room and utilities. Overhead cranes are provided in both canyons to allow remote equipment repairs, equipment replacement and process revisions.

The 221-F Canyon facility contains the Pu-239 PUREX separation process. Resumption of F Canyon operations is dependent on the Interim Management of nuclear materials Environmental Impact Statement (EIS), currently under development. The EIS will determine the final course of action needed to stabilize the existing plutonium-bearing materials stored in the facility, reactor areas and the Receiving Basin for Offsite Fuels, and to clean out and flush F Canyon to place it in a stand-by condition. Future F Canyon weapons production operations are not necessary because of the reduction in the nation's weapons stockpile.

2.2.2 NEW SPECIAL RECOVERY/PU STORAGE FACILITY

The New Special Recovery (NSR) facility is located on top of the 221-F Canyon. NSR was designed to replace the scrap dissolution systems in FB-Line, however, startup has been cancelled due to mission changes. All activities associated with the start-up of the New Special Recovery (NSR) facility have been terminated.

The Plutonium Storage Facility (PSF), a staging vault for NSR, is located in a hardened structure on top of the 221-F Canyon, and adjacent to the NSR facility. Startup of PSF has been discontinued due to mission changes.

Neither of the above facilities has been contaminated.

2.2.3 221-FB LINE

The FB-Line facility is located in a hardened structure located on top of the 221-F Canyon facility. The FB-Line is designed to process low concentration plutonium solution from the F-canyon processes into plutonium metal or oxide.

Extensive restoration of the FB-Line facility has been in progress for the last decade. These efforts have been successful in reducing radiation exposure risk associated with continued operation. The restart and subsequent operation of FB Line is required to transform the dissolved plutonium from 221-F canyon operations to a stable oxide or metal form for long term storage. With restart of the FB-Line, the two SNM storage vaults located in FB-Line will be utilized as required to support operation activity.

2.2.4 247-F, NAVAL FUELS FACILITY

The 247-F Naval Fuels Facility has been placed in a standby condition due to mission changes. The 247-F processing facilities will continue to be maintained in a safe shutdown condition. The 247-F facility contains a vault area which may be used for SNM storage. The 247-F facility's office and material storage areas will be maintained to support other potential activities. Approval to store Pu-239 in 247-F is pending.

2.2.5 235-F FACILITY

The 235-F facility contains the Actinide Billet Line (shutdown), Pu-238 finishing operations (shutdown), and three SNM storage vaults. The facility's critical systems will be maintained in continued safe shutdown of the Actinide Billet Line, Plutonium Fuel Form (PUFF) facility, and Plutonium Experimental Facility (PEF) operations. The 235-F facility is staffed to support the continued operation of the 235-F vaults to meet SNM storage requirements for the deinventory process.

2.2.11 PLUTONIUM STORAGE FACILITIES (continued)

The Plutonium Storage Facility (PSF) is a new partially automated (stacker retriever) vault capable of storing SNM in shipping containers. This facility has a wide range of nondestructive assay equipment for confirmatory and accountability measurements of materials as well as advanced accountability features. The PSF is located in a hardened structure on top of the 221-F Canyon adjacent to the NSR facility.

The Building 247-F vault could provide additional SNM shipping container storage capability. Shipping containers in this facility would be stored manually. The 247-F facility has been considered for restart, but is not currently in NMPD plans due to compliance issues and the cost effective use of manpower.

2.3.5 701-1F GUARD STATION

The 701-1F guard station serves as the main pedestrian entrance to the 200-F limited access area. The 701-1F building is located at the west entrance to the 200-F Area and serves as the vehicle exit control point for the area. Additional guard stations are located at the north entrance of F Area and west of the F-Area tank farm. Each of these serve as both vehicle and pedestrian entrances to the area.

2.3.6 704-F MEDICAL FACILITY

In addition to administration offices, 704-F contains the medical and cafeteria facilities for F Area. The 704-F medical facility is staffed with emergency medical personnel 24 hours a day. A physician is on duty 8 hours a day.

2.3.7 709-F FIRE STATION

The 709-F facility houses the area fire department, fire engines, and on-duty firemen. This facility is located outside the limited access area adjacent to the 701-1F guard station. Additional fire protection information is referenced in Vol. III, Section C.7 and B.5.22.

2.3.8 STEAM AND COOLING WATER

Steam and cooling water for F Area are provided through onsite facilities. Steam is distributed from an onsite, coal fired power plant via the F-Area steam supply system. F-Area domestic water is supplied from two wells to treatment facilities in building 282-F. Cooling tower water is circulated throughout F Area from a central storage basin.

2.3.9 ELECTRICAL POWER

Electrical power for F Area is provided by the 200-F Power Loop. The Power Loop is supplied by the 251-F Electrical Substation located in the northwest corner of F-Area. The 251-F Facility is a substation consisting of two 115/13.8 KV, 24 MVA transformers and associated switchgear. The 13.8 KV is distributed to F-Area through a 2000A bus. At the present time, the system demand is less than 40% of capacity. The two transformers are equipped with additional forced air cooling which would upgrade the rating to 32 MVA.

2.3.10 723-F LAUNDRY

Building 723-F provides laundry facilities for personnel protective clothing used in F Area. This facility could continue to operate in support of operations in the area.

3.0 SRS OPTIONS

Under the upgrade alternative SRS has the option of either selecting an existing facility suitable for upgrade or building a new facility.

The following section reviews a number of existing facilities and provides pros and cons for upgrading these facilities vs. building a new storage facility.

3.1 EXISTING VAULT STORAGE SPACE IN F-AREA

3.1.1 OPERATIONS

Four vaults are currently available for Pu 239 staging and storage as shown in Figure 3-1. Materials are received either by rail (spent fuel receipts) or truck (SST and SGT shipments from other DOE sites).

Rail shipments from onsite reactors and offsite foreign and research reactors are received and processed through F-Canyon with plutonium nitrate being sent to FB-Line and waste material sent to the F-Area Tank Farm. FB-Line converts the plutonium nitrate to either metal buttons or plutonium oxide. These product materials are then stored in the FB-Line Vaults or moved to the 235-F vaults for storage (currently active vaults). Normal truck receipt and shipment offsite is from the FB-Line Loading Dock.

Truck shipments from other DOE Sites may also be received or shipped from the Plutonium Storage Facility (PSF) Vault assuming the facility is started up and used during the deinventoring process. Receipt materials could be sent to either F Canyon or FB Line depending upon the recovery process required. New Special Recovery is also available (currently not in service) to process metal or oxide scrap if the capability is required during the deinventory process.

The approximate storage capacity for the four existing vault areas is shown in Table 3-1.

Plutonium Storage and Processing
F-Area

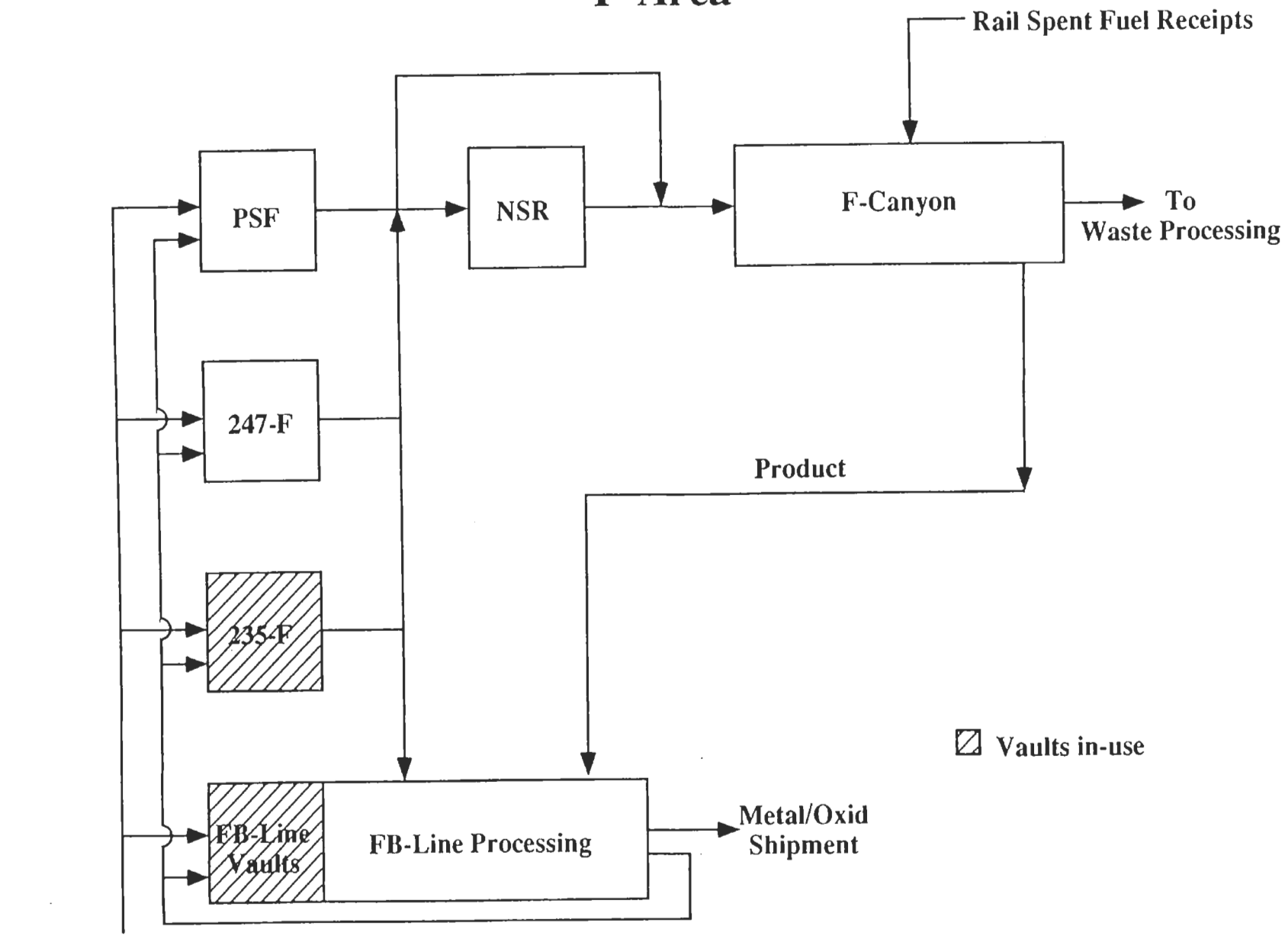


Figure 3-1

Table 3-1
Existing Pu 239 Vault Storage

Vault	Containers	Positions	Comments
FB-Line Vaults (2)	Pails, Cans, Shipping Containers	400 1094 60	Mostly oxide or recovery feed, but also, metal and scrap materials.
Bldg. 235-F Vaults (3)	Shipping Containers, Pails, Sleeves	431	Scrub Alloy, mixed oxides, alloys, lean oxides, metal forms, scrap.
Bldg. 247-F Vault (1)	Shipping Containers	540	Metals forms only. Not yet on line.
PSF Vault(1)	Shipping Containers	430	Metal forms, Oxides. Not yet on line.

The FB-Line Vaults and 235-F Vaults are currently in use and serve as staging vaults for the FB-Line Operation. The positions listed are the total number in each vault.

3.1.2 ISSUES

Each of the existing vaults in F Area has a number of issues which would have a major impact on consideration of their future use as a storage facility over the next 50 years. This section elaborates on these issues.

a) The FB-Line Vaults are located at the third and fourth levels of the facility. These vaults are manually operated vaults using administrative control. Exposure to operators working in these areas ranges from 30-100 mr/hr. Neither vault is easily expandable and current plans are to turn the FB Line over to EM once deinventory and clean-out are complete. Colocation of storage and process operations in one building is unacceptable for long term storage of Plutonium under the new regulations (6430.1A).

b) The 235-F Facility is a two-level hardened structure with 24,000 SF at each level. Currently approximately 50% of the space is available for other use assuming some level of D & R of contaminated areas and the relocation of office space, change rooms, and some maintenance and support areas to a new soft structure. The building contains three vaults per Table 3-1 which are currently in use. Relocation of these materials would be required if this facility were chosen for upgrade in order to make cost effective modifications. The building is a reinforced concrete structure of adequate design to qualify per current seismic requirements.

   Another plus for this location is the existing Perimeter Intrusion and Detection Alarm System, Entry Station, and Control Alarm Station.

   On the negative side, many internal asbestos walls will need to be removed, as well as a number of piping and electrical process and support systems which are partially contaminated.

   It appears that with all things considered the 235-F location is the best existing facility Option available in F-Area.

c) Building 247-F is a hardened concrete and metal structure located within a PIDAS zone to the northeast of the 221-F Canyon. The 247-F facility contains one vault for storage of SNM material. The existing vault contains approximately 540 storage positions.

3.1.2 ISSUES (continued)

Utilization of the 247-F Building for a consolidated storage facility would require extensive renovation. The existing facility's hardened structure consists primarily of the existing storage vault. This vault space is currently set up for manual operation. Renovation would require an expansion to approximately 10 times the current area to accommodate the anticipated storage and staging requirements. The renovation would be in areas where some contamination has occurred during past operation. The cost of the extensive renovation required for this existing facility would more than off set the advantage gained by the existing PIDAS Zone available at this location.

(d) The Plutonium Storage Facility (PSF) is a hardened structure made as part of the 221-F Canyon that has never been put in service.

The PSF vault contains approximately 430 positions for SNM storage. An estimated 2000 positions are necessary for anticipated de-inventory and additional storage requirements. Expansion of PSF would be very costly due to its location. Construction costs would increase significantly for work in this location. In addition, security requirements for a plutonium storage facility may require construction of a PIDAS zone encircling the 221-F canyon.

Utilization of PSF for a consolidated storage facility would require a separation of responsibilities for the facility and the 221-F Canyon which is scheduled for turnover to EM following the de-inventory process. In addition, DOE Order 6430.1A states that "New [plutonium] storage facilities shall be physically separated from process operations.." This requirement would be impossible to meet for PSF in its current location.

3.2 OTHER SRS SITE LOCATIONS

3.2.1 GENERAL DESCRIPTION

Several of the idled reactors at SRS have Class I space available which may be suitable for conversion to Plutonium Storage Vault use.

The Reactor Assembly Rooms (in L, P, and K Reactors at SRS) provide a high bay enclosed structure approximately 180 ft. x 220 ft. x 30 ft. high. This area would accommodate a 2000 position vault and the necessary staging operations. Additional cost advantages could be gained by use of existing PIDAS Zone, and administrative and utility support systems.

A review of the various reactors locations has confirmed the fact that the P-Reactor Assembly Area is a suitable concrete structure for a Plutonium Storage Mission. The other locations (L & K) were designed without a hardened assembly area and, therefore, would not be acceptable.

3.2.2 ISSUES

There are several issues which will impact the cost to upgrade. P-Reactor is listed below:

1) Residual contamination from handling fuel rods and from leaking contaminated water systems must be removed as part of the D&R process.

2) The location of the Reactor Buildings is not near existing plutonium and waste management infrastructure, thus making capital and operating costs potentially less attractive.

3) Existing Security Systems in P-Area will require extensive upgrade to meet regulatory requirements.

3.3 SELECTING THE OPTION

Based on a review of the most suitable existing facility, the SRS Position is to develop environmental data and cost estimates for 3 Options:

Option 1 - New F-Area Facility

Option 2 - P-Reactor Assembly Area Upgrade

Option 3 - 235-F Upgrade

Note that Option 2 data has not necessarily been refined in this report revision. Options 1 and 3 represent the bounding cases for SRS Upgrade Alternatives.

3.3.1 FUNCTIONAL DESCRIPTION

This section presents a description of the material handling functions for staging and storing Plutonium Metal and Oxide containers. A Block Flow diagram indicating the material flow through the Facility is shown in Figure No. 3-4. The description applies to all three Upgrade Options being presented for consideration unless noted otherwise. For a detailed description of the functional operation of the Facility see Appendix C in the Supporting Documentation Report.

Materials will be delivered to the storage facility in either Safe Secure Transports (SSTs), Safeguard Transports (SGTs), or Intrasite Transfer Vehicles (ISTVs) at a rate of up to 500 shipping packages per year. All shipping packages containing radioactive materials will be received in the truck unloading (TU) area. The truck will enter the truck bay and the material will be unloaded and moved to the Shipping Package Storage (SPS) area within the hardened facility.

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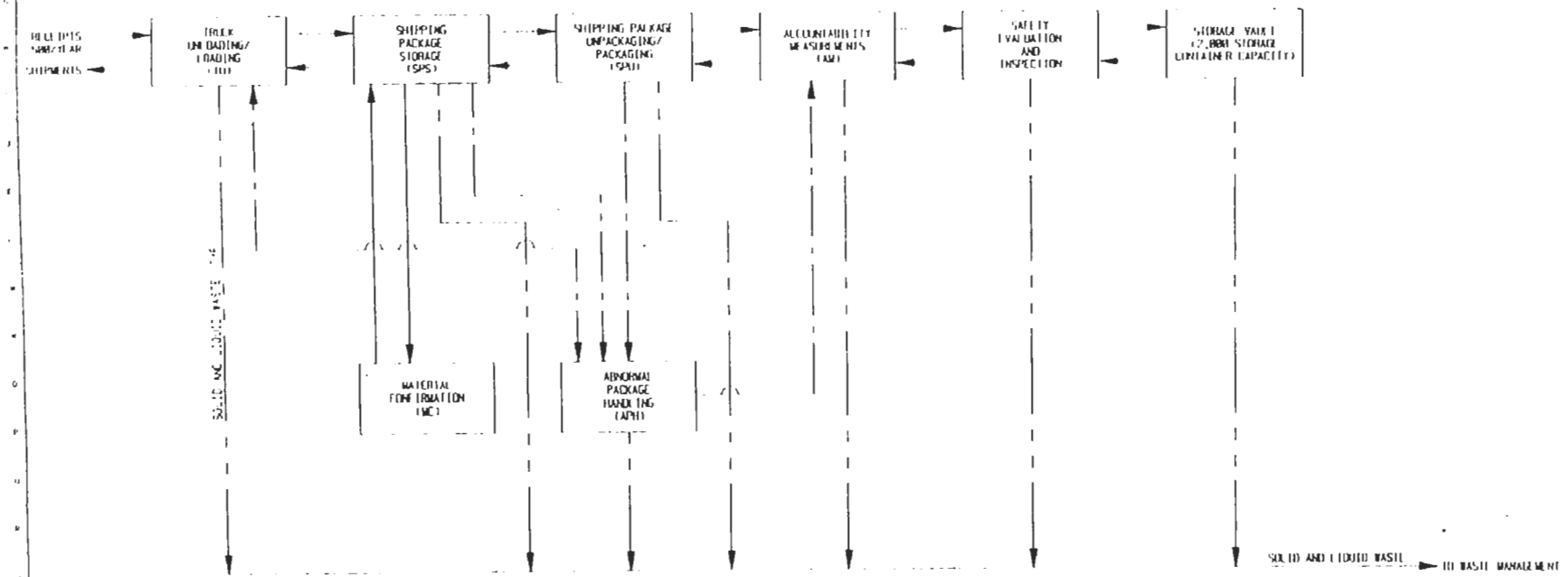
[1]The Transfer Verification Check, as detailed in DOE Order 5633.3A, Chapter II, page 11, consists of a confirmation of the shipping containers or item count, of TIDs integrity and identification, and comparison of the shipping documentation to provide assurance that the shipment was received intact.

NOTES

1. ALL STREAMS (EXCEPT BASE STREAMS) INCLUDE PITS, DIGOUTS, DRUMS AND SUMP RESIDUES.



LEGEND

- RECEIVING REQUIREMENTS
- SHIPPING REQUIREMENTS
- ABNORMAL PACKAGE FLOWS
- WASTE STREAMS

FIG. 3.4

UNITED STATES DEPARTMENT OF ENERGY

SAVANNAH RIVER SITE

WSRC

UPGRADED (ELEVATED)

RECONFIGURATION PROGRAM

PROPOSED NEW PLUTONIUM STORAGE FACILITY

OPTIONS 1, 2 & 3

BLOCK FLOW DIAGRAM (U)

3.3.1 FUNCTIONAL DESCRIPTION (continued)

In the TU Staging Area packages will be removed from CRTs, as applicable. The final receipt verification check[1] of items will be performed. This check will include verification of the number of shipping packages received, inspection of Tamper Indicating Device (TID) integrity, and verification of package identification. Each item will also be checked for contamination. Contaminated items will be decontaminated.

The items in the shipment will be moved from the TU area to the Shipping Package Storage (SPS) area. This area will serve as a temporary holding area while all items in a shipment are confirmatory measured. The SPS area also will serve as a holding area for items being shipped from the facility.

Material Confirmation (MC) includes weighing and taking gamma/neutron fingerprints of the shipping packages. After completion, shipping packages will be moved back to SPS or on to shipping package unpackaging.

The shipping package unpackaging/packaging (SPU) function includes unpackaging of shipping packages, removal of primary containers, weighing and reading bar code labels of the primary containers, and packaging of primary containers in shipping packages for shipping.

The handling of contaminated items is expected to occur on an infrequent basis, if ever. The contaminated items are handled in a shielded inert glovebox line equipped with dismantling, processing, inspection, assembly, and decontamination equipment. Most of the Abnormal Package Handling (APH) functions are performed manually.

The Accountability Measurement (AM) function includes equipment needed to perform non-intrusive nondestructive assay (NDA) of the primary containers. Before primary containers leave AM, an Engineered Storage Fixture (ESF) is attached to the primary containers for criticality spacing in order to prepare them for storage in the vault.

Other processes conducted in the facility that are not directly involved in the storage of the materials are:

- Waste Collection and Handling
- Equipment Maintenance.
- Equipment and Shipping Package/Storage Container Decontamination.
- Shipment preparation (Preparing materials for out-going intrasite or offsite transfer).
- Material Analytical Testing and Inspection.
- Abnormal Package Handling

Note that the Analytical Testing of the stored SNM materials will be performed in existing SRS laboratories.

3.3.1.1 TRUCK UNLOADING (TU) AREA DESCRIPTION

All SNM will be received at the facility or shipped from the facility through the Truck Unloading (TU) area. Separate truck unloading and loading areas will be provided for receiving or shipping equipment, materials, supplies, and waste, exclusive of SNM.

The TU area will include a Truck Receiving Bay, a Dock, Staging Area, and supporting areas.

The truck receiving bay for Options 1 and 2 will be totally enclosed, drive-in facility. The entry and exit point to the truck bay will be within the Perimeter Intrusion Detection and Assessment System (PIDAS) zone. The truck bay will be sized to allow entry of a single delivery vehicle at a time and to allow the delivery truck cargo doors to be opened after the vehicle is inside the bay, and the bay has been secured.

This bay will be designed for unloading and loading either Intrasite Transfer Vehicles (ISTVs), Safe Secure Transports (SSTs), or Safeguard Transports (SGTs). Most intrasite transfers will be made using ISTVs. However, some transfers as well as shipment to offsite destinations may be made using SSTs or SGTs.

3.3.1.1 *TRUCK UNLOADING (TU) AREA DESCRIPTION (continued)*

Due to insufficient available area, Option 3 will utilize an enclosed dock, instead of a totally enclosed truck receiving bay. While the truck will be exposed, the handling or movement of material onto or off the truck will be obscured as with the Option 1 and 2 cases.

Some shipping packages (ShPs) will be delivered as individual units while some will be restrained as groups of packages in Cargo Restraint Transports (CRTs). Materials will be received in shipping packages that typically consist of a containment vessel packaged within an outer steel drum (30 or 55 gallon size).

Upon arrival, the delivery vehicle will enter the secured area and the truck bay area. The TU area shall be sufficiently enclosed to obscure the handling or movement of materials on to or off of the delivery vehicle from personnel outside the TU area. After the vehicle has entered the TU enclosure and the truck outer bay door is closed, the truck cargo doors will be opened.

Unloading operations for an arriving delivery vehicle will not be started until all shipping packages from the previous shipment have been processed into SPS and the TU dock area has been surveyed for contamination and confirmed to be clean. The first step on arrival of a shipment after bringing the delivery vehicle to the dock is to verify shipping/receiver papers. The cargo doors are then opened to confirm that radiation levels in the cargo area are sufficiently low to allow personnel entry. The exterior surfaces of the containers will be surveyed for transferable contamination.

Detailed procedures for conducting the radiation surveys and checking the received packages for contamination and for unloading the delivery vehicles will be prepared by Health Protection (HP) and Operations, respectively. However, for the purposes of this document, the following steps can be assumed:

3.3.1.1 TRUCK UNLOADING (TU) AREA DESCRIPTION (continued)

1. HP workers will enter the trailer to monitor radiation levels. After confirming that radiation levels in the trailer are acceptable, a check for contamination on accessible surfaces of each package will be performed using an approved HP procedure.

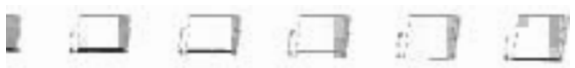
2. After completion of the HP checks, the shipping packages will be counted, and the number compared to pre-shipment information. If there are differences, the discrepancies must be resolved with the shipper before unloading of the vehicle can be initiated.

3. Equipment operators will off-load the shipping packages using shielded forklifts. If packed into a Cargo Restraint Transport (CRT), a CRT handler forklift will be used to move the CRT to the unloading dock area. The shipping packages will be removed from the CRT on the dock using a shielded forklift with special drum handling capability. The bar code identification must be verified and the TIDs inspected within one day of material receipt and prior to transferring a shipping package into the Shipping Package Storage (SPS) area. Note that these material handling operations will be conducted in accordance with standard procedures prepared by the Facility Operations.

   These procedures will include limitations for handling and physically positioning of shipping packages during all stages of materials handling and storage operations.

4. After the delivery shipment has been completely unloaded, surveyed for contamination, and successful receipt confirmation has been obtained per DOE Order 5633.3A, the delivery vehicle may be released. Before leaving, the vehicle may be reloaded with shipping packages (empty or full) or CRTs, or allowed to leave empty. The inner truck bay door will be closed and the outer door opened prior to the vehicle leaving.






3.3.1.3 CONFIRMATORY MEASUREMENT (CM) (continued)

Adequate instrument spacing and radiation shielding shall be provided in CM to prevent cross radiation interference and inaccurate confirmatory measurements.

Requirements for performing confirmatory measurements are defined in DOE Order 5633.3A.

Equipment for confirmatory measurement will include:

- Scales for weighing shipping packages (1)
- Confirmatory Measurement Counters (1)
- Computer terminals interfaced with the Accountability Function computer (1)

The unopened shipping package will be weighed and placed within the counter which will measure both a neutron and a gamma fingerprint. An entire shipment must pass through the Confirmatory Measurement (CM) operation within the appropriate time period (3 to 10 days as defined in DOE Order 5633.3A). All data from these operations will be logged in a central computer. The shipping packages will be returned to the SPS area or transferred to SPU via a shielded forklift.

3.3.1.4 SHIPPING PACKAGE UNPACKAGING (SPU) AND PACKAGING

Functional Requirements

The Shipping Package Unpackaging (SPU) operation must unpack all shipping packages (ShPs) which enter the facility, check them for contamination and send the primary containers, with the plutonium products in them, on to Accountability Measurements (AM). The overpack of all ShPs will be checked for contamination. It is assumed that SNM will arrive in primary containment vessels (PCV) in a ShP and this inner vessel will be unpacked and sent to AM. This area will provide enclosures for the initial opening and contamination check. The SPU area will have unpacking lines for unpacking normal shipping packages. Any abnormal, damaged and/or contaminated shipping packages will be forwarded to Abnormal Package Handling. Exact requirements for item tracking and HP operations such as weighing and barcoding, are undefined at this time.

3.3.1.4 *SHIPPING PACKAGE UNPACKAGING (SPU) AND PACKAGING (continued)*

Non-pit products (oxides & metals) will also be assumed to be in a PCV in a ShP. If the product is oxide, the PCV will be inside of a secondary container in the ShP. The secondary container will have to be checked for contamination before the PCV can be unpacked. Once this step is done, if necessary, the PCVs will be unpacked. Then the PCVs will be barcoded, weighed, and smeared, as necessary, and sent to AM. Empty ShPs will be reassembled.

One other major operation, packing of storage containers for shipment, must also take place. The quantity associated with this operation is expected to be much less than the flow for receiving ShPs. PCVs will arrive from AM to be packed. Gas Sampling and leak testing are required during the packaging operation. The gas sampling system consists of a customized laser sampling system for cutting a hole in the storage container sample tube and rewelding. A mass spectrometer is used to analyze the gas sample. The storage container leak checking equipment consists of an automated helium backfill and leak checking equipment. Packing will be done, and the Shps will be sent to Shipping Package Storage (SPS).

Inspection enclosures will have tritium detection and monitoring systems. The enclosures will be designed to accommodate all existing shipping packages.

The SPU area will contain space for waste collection, uncontaminated PCV storage and ShP packing and shielding material storage.

Description of Operation

All ShPs must be unpacked to be checked for damage or contamination. Because of the possibility of contamination, the unpacking steps will be performed in a glovebox, or other suitable enclosure, such as a ventilated hood, where if contamination is found it will be contained and decontamination of the enclosure is possible.

3.3.1.4 *SHIPPING PACKAGE UNPACKAGING (SPU) AND PACKAGING (continued)*

It is expected that the lid of the shipping package will be unfastened in a rim station where TID seal, rim bolt(s), and rim on each SPS will be removed manually. Lid removal and the rest of the unpacking steps will also be manual. Once a ShP is determined to be clean (i.e., cold, not contaminated), packing discs and rings will be removed to reach the PCV, then the PCV will be removed from the shipping package and sent to AM. If the ShP contains oxide, a secondary container must also be checked.

The incidence of physical damage or contamination is expected to be rare, but if it occurs, the ShP or inner containers would be moved to Abnormal Package Handling for further inspection, processing, and/or decontamination as necessary. The remaining operations are performed outside the enclosure to accommodate the clean flow of ShPs through SPU.

ShPs that require a secondary container must stay in the enclosure until the secondary container is also verified to be clean. PCVs may then be transported to another work area, where any necessary HP and item tracking operations, such as smearing, weighing, and barcoding are performed, and then will be transported to AM via a conveyor.

If at any check for contamination a PCV is not clean (i.e., hot, contaminated) the unpacking steps in the enclosure to that point are reversed, repacking the ShP to the state in which it arrived, and the entire package is "drummed-out" through the seal where it came into the enclosure. This drummed-out ShP is then sent to the Abnormal Package Handling Area for further inspection, decontamination, and processing.

During re-packaging operations, PCVs will arrive from AM to be packed. Then operations such as packing in a shipping package, as well as weighing, barcoding, smearing, and applying TIDs and labels, will be necessary. These operations are expected to be completed in the same lines as unpackaging.

3.3.1.4 *SHIPPING PACKAGE UNPACKAGING (SPU) AND PACKAGING (continued)*

Buffer staging (10 positions) will be required to hold StCs in ESFs (Engineered Storage Fixtures) before transporting them to the next unit operation. A staging area (rack) for empty fixtures (50 positions) is also necessary. This is a manually loaded rack from which handling equipment can retrieve an empty fixture. Fixtures may not be required depending on the criticality safety review.

3.3.1.5 *ACCOUNTABILITY MEASUREMENTS (AM)*

Functional Requirements

- Each assay instrument/system will be operated automatically and transfers between stations will be done using mechanical handling equipment.
- Each assay instrument to be properly shielded.
- AM facility temperature/humidity control.
- Computerized tracking system.

Description of Operation

All material to be stored in the PSF will undergo accountability measurement with the exception of pits. These materials will originate at the Shipping Package Unpackaging (SPU) unit operation and will be presented by powered roller or linear motor conveyor to AM in the welded inner primary container (PCV).

A unique barcode number will accompany each PCV entering AM. The number will be used to label a file to accumulate data from the NDA instruments and also to resolve shipper/receiver differences.

The AM area will have the capability to complete the assays within the 10 - 30 day time limit requirements that depend on material attractiveness as defined in DOE Order 5633.3A. Based on current technology, the assay can best be performed by the appropriate combination of the following measurement techniques:

3.3.1.5 *ACCOUNTABILITY MEASUREMENTS (AM) (continued)*

- Calorimetry
- Solid Isotopic Analysis
- Segmented Gamma Scanning
- Active/Passive Neutron Coincidence Counting

Precise temperature control of this area is needed which requires total enclosure with concrete walls and roof and a separate, independent HVAC system. Conveyors will transfer storage containers in and out of the room with a small overhead crane handling containers within the room.

The AM area will assay the contents of all storage containers except those containing pits.

Accountability measurements can be made round the clock, 365 days a year so that inventory checking can proceed even if the PSF is not receiving material. Since each analyzer will be completing its measurement at random times, a manual handling system can change out samples without any delay, thus making efficient use of the instruments. Redundant capability insures a high availability of the AM operation. Improved safeguards and security are also a benefit to automation as are error-free data generation and database entry and expeditious alerting of shipper/receiver differences.

Prior to leaving AM the PCVs, also called storage containers (StCs), will be placed into an engineered storage fixture (ESF) for vault storage criticality spacing requirements.

These storage fixtures will be designed to be compatible with material handling equipment and the vault storage racks. A minimal staging area for incoming StCs will be necessary in AM for buffering units fed from previous unit operations. This same staging area can be used for StCs retrieved from the vault for shipping and routine inventory. A staging area will also be necessary for supplying and handling empty ESFs.

3.3.1.5 *ACCOUNTABILITY MEASUREMENTS (AM) (continued)*

- Calorimetry
- Solid Isotopic Analysis
- Segmented Gamma Scanning
- Active/Passive Neutron Coincidence Counting

Precise temperature control of this area is needed which requires total enclosure with concrete walls and roof and a separate, independent HVAC system. Conveyors will transfer storage containers in and out of the room with a small overhead crane handling containers within the room.

The AM area will assay the contents of all storage containers except those containing pits.

Accountability measurements can be made round the clock, 365 days a year so that inventory checking can proceed even if the PSF is not receiving material. Since each analyzer will be completing its measurement at random times, a manual handling system can change out samples without any delay, thus making efficient use of the instruments. Redundant capability insures a high availability of the AM operation. Improved safeguards and security are also a benefit to automation as are error-free data generation and database entry and expeditious alerting of shipper/receiver differences.

Prior to leaving AM the PCVs, also called storage containers (StCs), will be placed into an engineered storage fixture (ESF) for vault storage criticality spacing requirements.

These storage fixtures will be designed to be compatible with material handling equipment and the vault storage racks. A minimal staging area for incoming StCs will be necessary in AM for buffering units fed from previous unit operations. This same staging area can be used for StCs retrieved from the vault for shipping and routine inventory. A staging area will also be necessary for supplying and handling empty ESFs.

3.3.1.5 *ACCOUNTABILITY MEASUREMENTS (AM) (continued)*

- Calorimetry
- Solid Isotopic Analysis
- Segmented Gamma Scanning
- Active/Passive Neutron Coincidence Counting

Precise temperature control of this area is needed which requires total enclosure with concrete walls and roof and a separate, independent HVAC system. Conveyors will transfer storage containers in and out of the room with a small overhead crane handling containers within the room.

The AM area will assay the contents of all storage containers except those containing pits.

Accountability measurements can be made round the clock, 365 days a year so that inventory checking can proceed even if the PSF is not receiving material. Since each analyzer will be completing its measurement at random times, a manual handling system can change out samples without any delay, thus making efficient use of the instruments. Redundant capability insures a high availability of the AM operation. Improved safeguards and security are also a benefit to automation as are error-free data generation and database entry and expeditious alerting of shipper/receiver differences.

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These storage fixtures will be designed to be compatible with material handling equipment and the vault storage racks. A minimal staging area for incoming StCs will be necessary in AM for buffering units fed from previous unit operations. This same staging area can be used for StCs retrieved from the vault for shipping and routine inventory. A staging area will also be necessary for supplying and handling empty ESFs.

3.3.1.6 STORAGE VAULT (SV)

Functional Requirement

The vault unit operation has three functional requirements. First, storage containers shall be placed into and stored safely and securely in the vault over the entire life of the facility. Second, a particular container must be retrieved safely and securely from the vault at any time during the life of the facility. Third, the vault shall have the capability to meet inventory and surveillance requirements in accordance with DOE orders during the life of the facility.

Description of Operation

The vault storage area, associated equipment, and supporting facilities will be designed to remotely place and remotely retrieve storage containers placed in discrete storage compartments located in a system of storage racks inside a secure vault. The storage containers are mounted in an ESF and comprise the storage container package.

These packages are transported by an automated guided vehicle (AGV) to the portal in the vault area. After access to the vault is granted, the portal door is remotely opened (and verified open by the operator) and the storage container package and vehicle pass into the portal.

The outer portal door is closed, verification is made on the StC barcode and CCTV verification of no personnel in portal. The vault door is opened allowing the AGV with StC to enter the vault. They enter a storage bay where the storage container package is automatically off-loaded into a storage rack position.

The storage vault in Option #1 contains 4 storage bays, 75 feet long, with a single vertical storage array on each side of a 6 feet wide access aisle. Space is provided between the vault and the control room to add one additional storage bay (500 positions) depending on future needs. Storage racks are 18 inches by 18 inches by 24 inches high. Storage will be stacked 5 tiers high. Racks will be anchored to concrete partition walls 12 inches thick (minimum).

3.3.1.6 STORAGE VAULT (SV) (continued)

Storage containers will be positioned, retrieved, and verified by an automatic guided vehicle (AGV). The vault is designed for automatic operation with no personnel entry required. Option #2 and #3 require a modified configuration due to installation in existing structures. However, the concept remains the same as described above.

The automation baseline consists of a warehousing type wire guided or wireless AGV lift truck. The AGV will pick up a load from the Accountability Measurements (AM) or Safety Evaluation areas, transport the load to the vault, and store the load in an appropriate location. In addition, the AGV will retrieve a load from a vault location and transport the load to Safety Evaluation or to AM. The other AGV mission will be inventory and surveillance. The AGV will transport a set of sensors around the vault. The sensors will perform the required in-situ physical inventory and verification functions.

The storage bays will be designed to be criticality safe, minimize radiation exposure outside the bay, minimize cost, maximize reliability of the facility, and maximize safety to the operating personnel.

The preliminary design will minimize combustible material in the vault, and therefore provide for fire detection only. Fire suppression requirements for the final design of the storage vault will be established by a Fire Hazards Analysis and the facility safety analysis.

3.3.1.7 *ABNORMAL PACKAGE HANDLING (APH)*

Abnormal Package Handling (APH) provides an inert and dry air glovebox line for handling damaged and/or contaminated shipping packages (ShPs), storage containers and SNM materials which must be repackaged prior to long term storage. The containers are brought into APH, unpackaged, inspected, and the SNM reprocessed as required. The oxide and metal is repackaged in a welded bagless transfer (boundary) container and the clean bagless transfer container is packaged in a new long term storage primary containment vessel (PCV). The APH is especially designed for contamination control with HEPA filters on the inlet and exits ports of all gloveboxes and the entry and exit ducts to the enclosed area. Most unit operations are contained in wing cabinets which are designed in a modular configuration to allow complete replacement of the cabinet with minimum turnaround time.

The entire glovebox line is normally operated through gloveports. The gloveboxes are shielded as required to maintain ALARA requirements. Several hoods are also used at either end of the line and along the room wall.

A flowsheet depicting the various work stations in the APH line is shown in Figure 3-5. A conceptual layout is shown in Figure 3-5-1.

The work stations provide for the following activities:

- Outer container Handling and Unpackaging.
- Material transfer.
- Calcination.
- SNM sampling and weighing.
- Waste Handling.
- Co_2 Decontamination.
- Oxide Dumper/Mixer.
- Bagless Transfer Packaging.
- PCV Packaging and Welding.
- PCV weld NDE.
- PCV Tube Pinch/Weld and NDE.

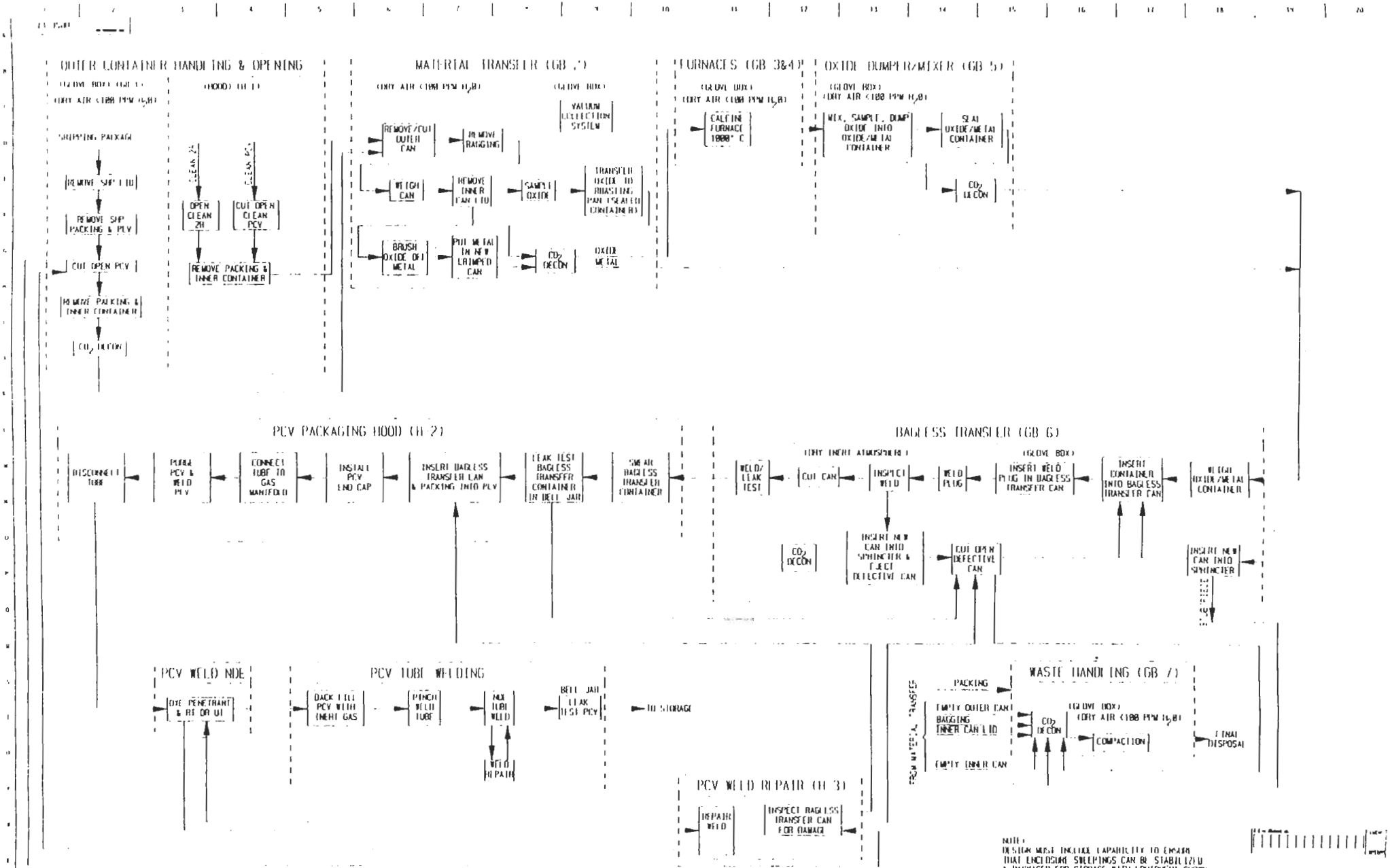
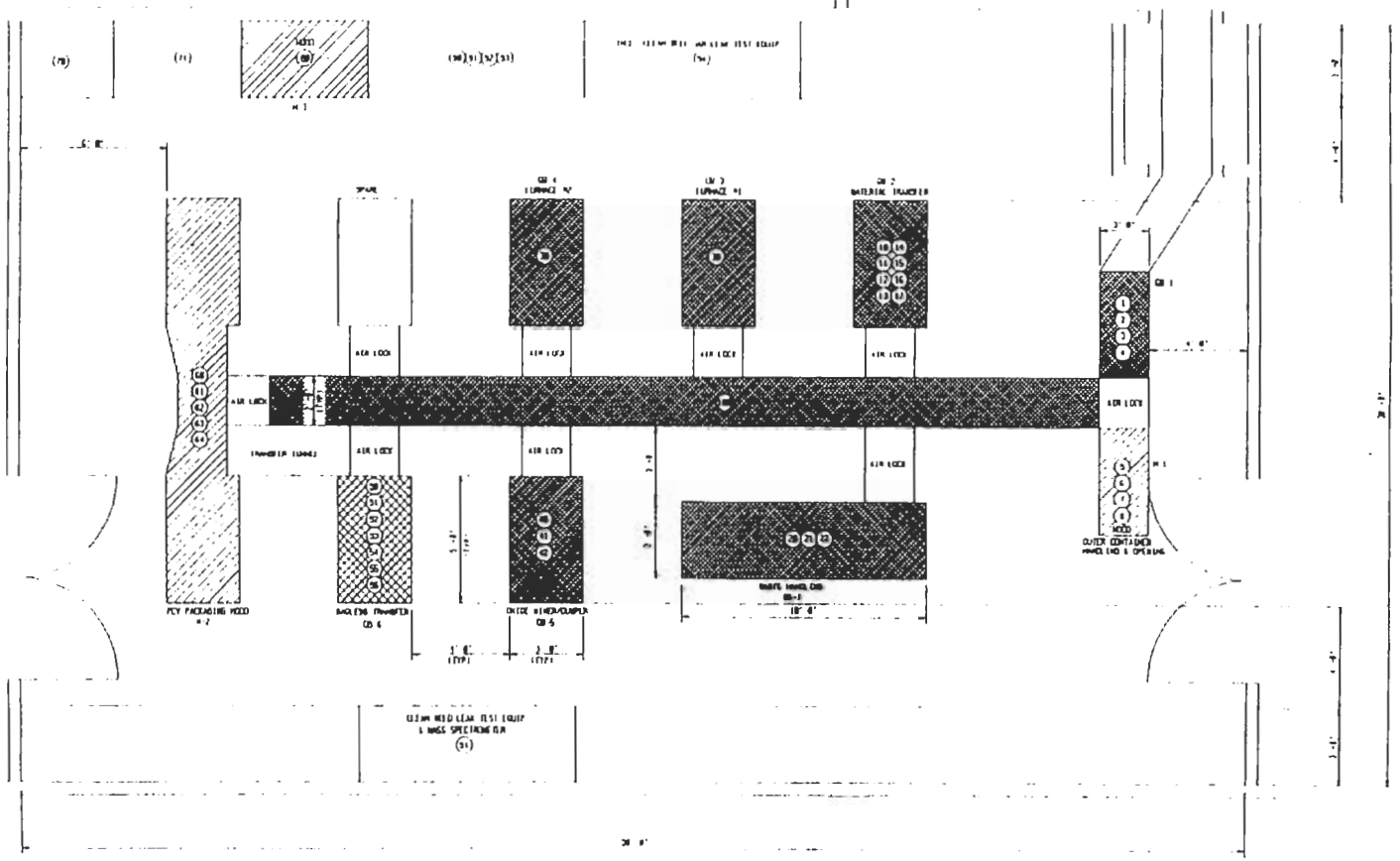


FIG. 3-5

UNITED STATES DEPARTMENT OF ENERGY
SAVANNAH RIVER SITE

WSRC
UPGRADE SCENARIO
RECONFIGURATION PROGRAM
PROPOSED NEW PLUTONIUM STORAGE FACILITY
ABNORMAL PACKAGE
HANDLING FLOWSHEET (U)



UNIT OPERATIONS KEY

OUTER CONTAINER HANDLING & OPENING (GB 1 & II.1)

1. SHIPPING PACKAGE (SHIP) ENTRY PORT
2. SHP LID REMOVAL EQUIPMENT
3. SHP PACKING & PCV REMOVAL EQUIPMENT
4. PCV CUTTER TO OPEN CONTAMINATED PCV
5. CLEAN PCV & 2P (STPP) PORT
6. PCV CUTTER TO OPEN CLEAN PCV
7. UNPACKING & REMOVAL OF INNER CONTAINER
8. AIR LOCKING FIXTURE

MATERIAL TRANSFER (GB 2)

10. CRIMPED CAN OPENER
11. REMOVE OUTER CAN & BAGLESS
12. INNER CAN WELDH STATION
13. OXIDE DUMPER/SAMPLER TO PUT OXIDE IN ROASTING PAN
14. BAGLESS STATION FOR METAL SAW, BALER
15. PUT OXIDE & PUR METAL IN NEW CRIMPED CAN
15. CO_2 CLEAN STATION
16. OXIDE BRUSHES, VACUUM, CRIMP CANS
17. CUTTER FOR NEW INNER CAN

WASTE HANDLING (GB 2)

20. CO_2 OXIDE STATION
21. WASTE COMPACTOR
22. WASTE HANDLING EQUIPMENT

FURNACE #1 & #2 (GB 3 & 4)

30. CALCINING FURNACE, CONTROLS, OFF GAS SYSTEM

OXIDE MIXER/DUMPER (GB 5)

40. OXIDE MIXER/SAMPLER/DUMPER (IRON ROASTING PAN TO OXIDE CONTAINER)
41. INTERIM CONTAINER STORAGE RACK
42. CO_2 OXIDE STATION

BAGLESS TRANSFER (GB 6)

50. WELDH STATION (FOR OXIDE & METAL CONTAINER)
51. BAGLESS TRANSFER SPHINCTER UNIT
52. BAGLESS TRANSFER CAN LOADER FOR OXIDE CONTAINER INTO BAGLESS TRANSFER CANS
53. BAGLESS TRANSFER WELDER/CUTTER ASSEMBLY
54. WELD LEAK TEST EQUIPMENT
55. OXIDE/METAL BAGLESS TRANSFER CAN CUTTER (METAL GLOVE BOX)
56. BAGLESS TRANSFER CAN TRANSPORT EQUIPMENT CO_2 CLEAN STATION
57. TRANSFER TUNNEL BAGLESS TRANSFER CAN TRANSPORT EQUIPMENT

PCV PACKAGING HOOD (GB 2)

60. SHEAR TEST STATION FOR BAGLESS TRANSFER CAN
61. WELD AIR LEAK TEST FOR BAGLESS TRANSFER CAN
62. LOADER FOR DISPOSING BAGLESS TRANSFER CAN INTO PCV
63. EQUIPMENT TO HOLD PCV ASSEMBLY & WELD LID ON
64. INERT GAS PURGING EQUIPMENT OF PCV TUBE SHELL WELDING

PCV WELD INSPECTION

70. WELD DYE PENETRANT TEST STATION
71. RADIOGRAPH OR ULTRASONIC NDE EQUIPMENT

PCV WELD REPAIR (GB 3)

80. GASKET REPAIR HOOD OF PCV WELD

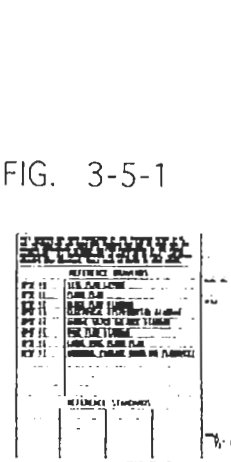
PCV TUBE WELDING

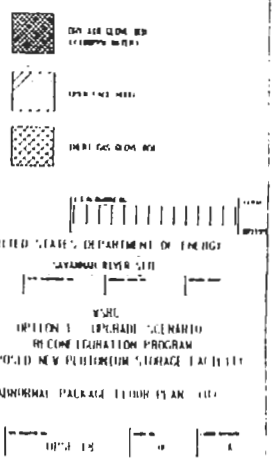
90. PCV INERT GAS BACKSIDE STATION
91. PCV TUBE PUNCH & WELD EQUIPMENT
92. TUBE WELD NDE EQUIPMENT
93. EQUIPMENT TO REPAIR TUBE WELD
94. PCV WELD AIR LEAK TEST STATION

MATERIAL HANDLING

100. LINEAR MOTOR CONVEYOR

FIG. 3-5-1





3.3.1.7 ABNORMAL PACKAGE HANDLING (continued)

Operations performed in each APH operation are as follows:

1. Outer Container Handling and Unpackaging

   - Damaged or contaminated ShPs are mated up to a glovebox with a dry air (<100 ppm water) atmosphere.
   - The ShP lid is removed.
   - The PCV is removed via glovebox handling equipment and the PCV cut open.
   - In an adjacent clean hood, connected to the glovebox with an airlock, 2R shipping packages and clean PCVs are introduced and opened by unbolting the 2R lid and/or cutting the PCV.
   - Internal SNM cans are removed from the PCVs, decontaminated with CO_2, and passed through an airlock to a linear motor transfer system which transports material between all unit operations.

2. Material Transfer

   - The SNM containers enter another dry air glovebox where the outer can and plastic bagging are removed.
   - The inner can is weighed and its lid removed.
   - The oxide is sampled and dumped into a roasting pan.
   - If the Pu is metal, any surface oxide is brushed off and metal inserted into another can which will eventually be inserted into the bagless transfer can.
   - Before exiting this glovebox, the oxide roasting pan is covered and the cans with metal are deconned with CO_2.

3.3.1.7 ABNORMAL PACKAGE HANDLING (continued)

3. Calcination

   - The roasting pans with oxide are transferred into one of two dry air gloveboxes, each contains one furnace.
   - The oxide is heated to 1000° C for one hour.
   - The roasting pan is covered and decontaminated prior to exiting the glovebox.

4. Oxide Mixer/Dumper

   - The oxide roasting pan enters this dry air glovebox, is attached to the rotating mixer/dumper which is inverted and dumps the oxide into a new food pack type can.
   - During the dumping process a sample is taken and sent to the laboratory for analysis.
   - A lid is crimped on the oxide can and then the can is decontaminated with CO_2.

5. Bagless Transfer Packaging

   - The oxide and metal cans enter this dry inert glovebox and are weighed.
   - A new bagless transfer can is inserted into the glovebox sphincter seal assembly.
   - The oxide/metal crimp cans are inserted with manual assist handling equipment into the bagless transfer can while in the inert gas glovebox environment.
   - A hollow weld plug is inserted into the bagless transfer can and TIG welded to the bagless transfer can.
   - The weld is inspected via a rate of rise leak test.

3.3.1.7 ABNORMAL PACKAGE HANDLING (continued)

- The sealed, bagless transfer can is then cut in the middle of the weld separating it from the stub which remains in the sphincter assembly.

- The bagless transfer can is transferred below the glovebox via a positioning table to the adjacent PCV packaging hood.

- This station also contains equipment for cutting open defective bagless transfer cans.

6. PCV Packaging Hood

   - The bagless transfer container (BTC) smeared for contamination in this hood assembly.

   - The BTC is then leak tested in a bell jar.

   - The BTC is then placed in a PCV with the help of manual hoist handling equipment.

   - An end cap is placed on the PCV and welded while purging the PCV tube with a gas such as argon.

   - The PCV tube is disconnected and valved off.

7. PCV Weld NDE

   - The PCV weld is then checked with dye penetrant as well as radiographed or ultrasonically inspected.

8. PCV Weld Repair

   - If the PCV weld is defective it is repaired if possible in this hood.

   - If not repairable, the PCV is cut open in the Step #1 hood.

   - The bagless transfer can is inspected for damage and reinserted in the process of packaging in a PCV.

3.3.1.7 ABNORMAL PACKAGE HANDLING (continued)

9. PCV Tube Welding

   - The PCV is backfilled with the desired inert gas through the 1/4" tube.
   - The PCV tube is pinched and welded.
   - The tube is then inspected via NDE.
   - If required, the tube weld is repaired and re-inspected.
   - A final bell jar leak test on the PCV is performed.
   - The PCV is sent to storage or shipped out of the facility through the truck unloading/loading area.

10. Waste Handling

    - All waste material is sent to this dry air glovebox via the linear motor transfer system.
    - Upon entry wastes can be deconned with CO_2.
    - It may then be compacted before being placed in a waste container.
    - Waste generation as shown in Section 6.0 is based on processing one abnormal container per year. The period of operation is assumed to be 2 weeks.

3.3.1.8 SAFETY EVALUATION AND INSPECTION

Prior to entering the vault, all storage containers will be transported to this area on the AGV for material confirmation and baseline digital radiography/computed tomography.

In order to maintain the integrity of the storage container and its content over an extended period of time, provisions for routinely sampling and testing a small percentage of the vault storage containers is provided in the Safety Evaluation area.

3.3.1.8 *SAFETY EVALUATION AND INSPECTION (continued)*

This area provides capability for radiography and confirmatory measurement (NaI Spectrometer).

The following is a preliminary list of equipment that will be provided to perform the above analyses:

- Digital Radiography, Computed Tomography
  - Camera, Sensitizing screen, 3 axis positioning equipment, controller and computer system.
  - Linear Accelerator (2 MEV).
  - Overhead crane.

- Confirmatory Measurement Counter (Neutron & Gamma Fingerprint). This equipment is provided for Safeguards and Security purposes.

  This equipment is provided in the SPU area and used when shipping storage containers.

- StC Gas Sampling.
  - Laser Sampling System (Customized) for cutting hole in StC and rewelding.
  - Gas Sampling Mass Spectrometer for analysis.

- StC Leak Checking.
  - Automated helium backfill & leak check equipment.

3.3.1.9 *THIRD PARTY INSPECTION (IAEA)*

A separate suite of rooms is provided adjacent to the vault entrance for Third Party Inspection. The following features are included in this area:

- A separate area of about 1,000 sq. ft. for the exclusive use in processing records, studying reports, calibrating and repairing, instruments, and loading and unloading cameras, etc.

3.3.1.9 THIRD PARTY INSPECTION (continued)

- A camera located at the vault entry point for recording the entry and removal of containers from the vault and identifying them by bar code number, etc., camera shall be automatically triggered by the proximity of the material entering the vault.

- Power to the equipment shall be separate from the main facility, isolated from surges and should be non-interruptable.

- Power (to include a UPS) and other utilities shall be provided, but equipment will be provided by the inspection agency.

3.3.2 EQUIPMENT LISTS

The primary and secondary equipment lists for each option are included in Appendix B.1.

3.3.3 SUMMARY SCHEDULE

A summary schedule (Figure 3-12) is included which provides the major task duration's for the proposed design, construction, and startup of the Upgrade Options.

The Summary Schedule is based on a programmatic ROD in 3/96. If a decision were made to select the Upgrade Alternative at each storage site, conceptual design and a site specific EIS would start leading to Project Authorization and a site specific ROD by 3/99.

A six year design/construct phase is assumed.

The Facility will start in CY 2005. The loading operation will require 3 years on the front end and 3 years on rear end of life are assumed for deinventory operation. Approximately 44 years of steady state storage where routine surveillance and safeguards of stored material are the main objective of the Operating and Security staff.

IGURE 3-12

ONIUM STORAGE FACILITY
IEDULE FOR LIFE CYCLE

PROPOSED PLUTO
SUMMARY SCH

3.3.3 SUMMARY SCHEDULE (continued)

Once deinventory is complete. The facility would be shut down for a complete evaluation of contamination and development of a decontamination and removal plan (assumed to take 1 year). Decontamination is assumed to take one year with dismantlement occurring over the last year.

3.3.4 SERVICE DIAGRAMS

The following service diagrams are included in Appendix B.2 for design and estimating guidance:

HVAC Flow Diagram - Figure B.2-1
Electrical Distribution Diagram - Figure B.2-2
Annual Water Balance Diagram - Figure 4-1

3.4 PRIMARY AND SUPPORT FACILITY DESCRIPTION

3.4.1 OPTION 1 - NEW F-AREA FACILITY

Site Location

The Option #1 site is located north of the 235-F building and east of the 247-F Building in F Area as shown in Figure 3-2. The site covers approximately 5 acres and will be protected by a PIDAS with entrance control facility and a central alarm station.

Primary Structure

A footprint of the Option 1 Proposed Plutonium Storage Facility is shown in Figure 3-3 and listed as item 1 in Table 3-2. The MAA portion of the PSF is a reinforced concrete structure. One enclosed bay is provided for SST/SGT entry and unloading. A separate outside concrete dock is available for normal supply and waste handling purposes. Shipping packages and or CRTs are off-loaded via a shielded fork lift.

The staging operation which includes confirmation measurement, unpackaging/packaging, abnormal package handling and accountability measurement. Vault exhaust fans and filters, waste management, health protection, automatic guided vehicle (AGV) maintenance, general maintenance shops, and control rooms are also provided within the hardened structure.

Separate provisions near the vault are provided for safety evaluation systems and IAEA inspection. The storage vault contains 4 storage rooms 75 feet long with a single vertical storage array on each side of a 6 feet wide access aisle. Storage racks are 18 inches by 18 inches by 24 inches high. Storage will be stacked 5 tiers high. Racks will be anchored to concrete partition walls 12 inches thick. Storage containers will be positioned, retrieved and verified by a AGV through entry portal double doors and a 6' wide door into each storage room. The vault is designed for automatic operation with no

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FIGURE 3-3

OPTION # 1

STAGING & VAULT FLOOR PLAN

This Figure determined to contain UNCI. See Volume IV, UNCI Supporting Documentation, issued as a separate document, NMP-PLS-940288.

Shipping package storage (SPS) will be enclosed by a 1' thick concrete wall for security and shielding. Heavy duty lockable shield doors will be installed at the entrance of SPS. A shielded forklift will move shipping packages between each of these unit operations. Storage containers will transfer via conveyor from AM, through the wall to an AGV pick-up station. The AGV will transfer storage containers into the vault through a double door portal.

9. No walls will extend higher than 10' except for the vault walls which will be 14' high. Columns will extend up to support the roof beyond the 10' high walls. Interior walls to be 8" thick concrete.
10. The exhaust fan room will have a 20' ceiling height to the hardened roof. Ducts will run above the 10' false ceilings to all other rooms within the MAA. The exhaust ducts will drop through each room ceiling, mount to the walls and pull air through single HEPA's mounted 1' above floor level. The roof will also have a 14' x 14' hatch for equipment installation and replacement.
11. Supply air ducts will penetrate the MAA hardened wall and run above the 10' ceiling level and supply air through ceiling mounted registers.
12. The storage vault will have 1' thick concrete partition walls between each aisle. The vault will have a 1' thick roof interior to the 20' high MAA roof. Supply air ducts will feed through the 14' high vault roof mounted grills. Exhaust ducts will penetrate the roof, run down the walls and exhaust air from just above floor level through HEPA's at each grill opening.
13. A grid of maintenance catwalks above the MAA false ceilings will extend to access the ducting, wiring, piping, etc. above the vault roof area. The area above the vault roof will be sealed off with wire mesh fencing with locked door access for maintenance.
14. The SST/SGT bay will be unconditioned with powered roof ventilators and side wall louvers for diesel exhaust and ventilation.
15. A second 8" thick concrete wall is required for security reasons spaced 4' from the exterior 2' thick vault west wall. The 4' space between the two walls will be accessed from within the MAA for inspection and vault isle microwave unit repair.

3.4.1 OPTION 1 - NEW F-AREA FACILITY (continued)

Support Facilities:

A complete listing of support facilities are shown in Table 3-2. Option 1.

1. Administrative Building

Existing administrative buildings are available in F-area to house approximately 50 personnel associated with the proposed Option 1 Facility.

2. Guard Station (Item 3, Table 3-2)

The guard station will provide access control to the PIDAS zone including both pedestrian and vehicles. Metal and explosive detectors, badge readers, and other personnel identification devices will be utilized to prevent entrance of unauthorized personnel or prohibited articles. The exit is a physical barrier with access controls utilizing SNM detectors and metal detectors to prevent removal of SNM.

Design details are as follows:

1. Steel frame with brick veneer.
2. Separate guard station within building to be steel plate reinforced.
3. Building to include access control computer terminal, card readers, hand geometry station with PIN pad, turn style and metal detection equipment.
4. Rest Rooms - (2) Small.
5. Two Offices - 10' x 10'.

3. Maintenance Facilities

Existing F-area maintenance facilities in the 247-F area are sufficient and close to the proposed New Option 1 Facility.

4. Shipping/Receiving Dock (Item 5, Table 3-2)

A shipping/receiving dock will be utilized for receipt of materials shipment of wastes, and storage areas for compressed gases and packing materials.

Design details are as follows:

1. Concrete dock with two load levelers.
2. Dock to be covered with metal roof.

5. Cooling Tower Water Facility (Item 6, Table 3-2)

This building will contain equipment to provide cooling water for the Pu storage facility. Two 300 ton chillers and associated equipment will be utilized with the cooling tower.

Design details are as follows:

1. Two 300 ton cooling towers.
2. Slimicide and corrosion inhibitor water treatment equipment also to be installed adjacent to tower in a small)10' x 10') unconditioned pump house (electric unit heater inside).

6. Substation (Item 7, Table 3-2)

Electrical power to the storage facility will be supplied through a substation located inside the PIDAS zone. The substation will contain two 13.8KV/480V transformers.

Design details are as follows:

1. Substation to be installed on fenced-in concrete slab.

7. Emergency Generators (Item 8, Table 3-2)

Emergency power to the storage facility will be provided through diesel powered emergency generators. The generators and associated switchgear provide for the generation, switching, and distribution of emergency power to safety class equipment and instrumentation.

Design details are as follows:

1. Two 1200 KVA diesel generators, two 600 gallon diked fuel tanks, and associated switchgear to be installed in this facility.
2. Construction to be a hardened 2' thick seismically qualified tornado resistant concrete building since this is safety class (seismic) equipment.

8. Diesel Fuel Storage (Item 9, Table 3-2)

Diesel fuel will provide fuel for the emergency generator and will be stored in a tank adjacent to the generator building.

Design details are as follows:

1. One 10,000 gallon single wall diesel tank to be installed above ground with leak detection equipment in a concrete dike.
2. Tank truck fill equipment and discharge pump and piping must be provided.
3. Tank truck diked unloading area with sump and pump must also be provided.

9. Construction Laydown (Item 10, Table 3-2)

The construction laydown area accommodates material and equipment storage and provides limited on-site fabrication areas. Controlled receiving and staging areas are also located in the laydown area.

Design details are as follows:

1. This area to be a 1/2 acre fenced in with gravel surface.

10. Inert Gas Storage Tanks (Item 11, Table 3-2)

Two systems required; one 1600 gallon tank for Argon (gloveboxes) and a 2nd 1200 gallon tank for Nitrogen (NDA instruments). Carbon steel tanks will be installed on a concrete pad outside the staging building for supply of Argon to the gloveboxes in the Abnormal Package Handling Area (APH) and nitrogen to the NDA instruments.

Design details are as follows:

1. Provide argon distribution piping to APH.
2. Provide one DeWar flask loading station for NDA instruments.

11. Exhaust Stack (Item 12, Table 3-2)

A 100' carbon steel exhaust air stack will be installed on a concrete pad.

12. Supply Air Chillers (Item 13, Table 3-2)

Two 300 ton chillers will be installed on a concrete pad adjacent to the staging building and supply chilled water to the building supply air fans' cooling coils.

Design details are as follows:

1. Concrete pad (30' x 40') with a pre-engineered metal building enclosing the chillers.

3.4.2 OPTION 2 - P-REACTOR ASSEMBLY AREA UPGRADE

Site Location

The proposal Option 2 site is located in P-Area to the north of and joining the 105-P Building as shown in Figure 3-7. The site is protected by an existing PIDAS Zone (requiring upgrades) and covers approximately 11.5 acres.

Primary Structure

The P-Reactor Assembly Area was chosen as an option for a Plutonium Storage Vault due to several favorable features of the structure and surrounding area. The 105-P building is currently not in use and contains a hardened assembly area suitable for housing all required staging operations and the storage vault. The assembly area is actually a separate building from building 105. However, a small section of the 105 building adjoining the assembly building, would also be included in the upgrade. See Layout of Staging & Storage Operations in Figure 3-8. The existing structure is approximately 22,000 SF of open area at grade level with 40 ft. high concrete walls either 2 ft. 6 in. thick or 3 ft. thick. Massive concrete columns on 36 ft. and 60 ft. centers support the concrete roof. A basement level with 3,600 SF is proposed for the vault.

The Assembly Area is relatively clean and does not contain a large amount of in-place equipment systems, which reduces D & R and upgrade capital costs. Two rooms, the final assembly room and the basement, contain low levels of contamination and must be decontaminated before existing equipment and racks can be removed.

The existing truck bay must be extended to include room for SST/SGT Unloading Operation.

Existing ventilation systems are totally inadequate for Plutonium Storage and would be replaced with similar systems specified for Option I - New F-Area Facility.

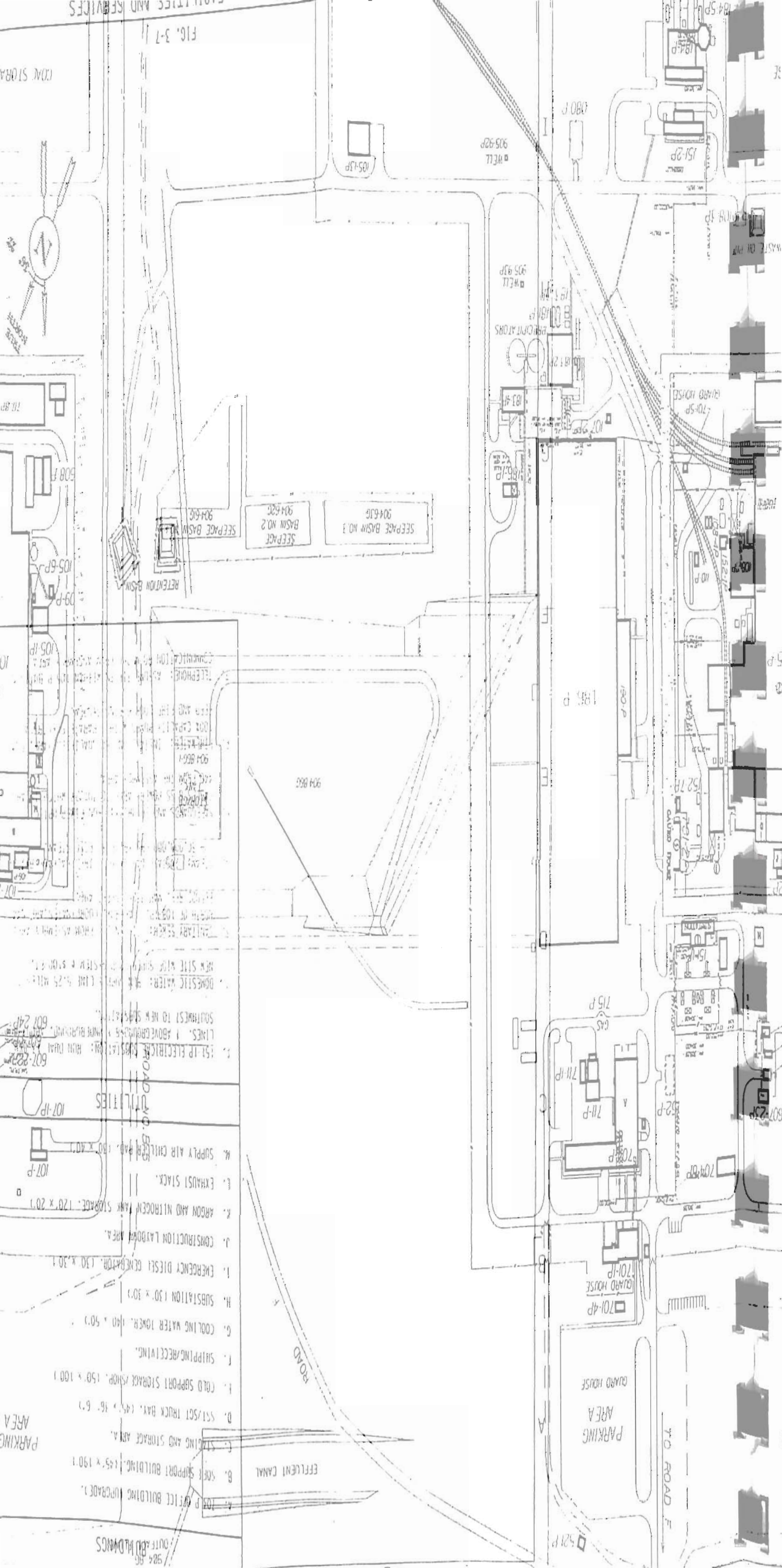

SEEPAGE BASIN NO.3
SEEPAGE BASIN NO.2
SEEPAGE BASIN NO.1
RETENTION BASIN
EFFLUENT CANAL
PARKING AREA
GUARD HOUSE
TO ROAD
ROAD

FIGURE 3-8

OPTION # 2

FLOOR PLAN

This Figure determined to contain UNCI. See Volume IV UNCI Supporting Documentation, issued as a separate document, NMP-PLS-940288.

3.4.2 OPTION 2 - P-REACTOR ASSEMBLY AREA UPGRADE (continued)

3. Cold Support Storage and Shop (Item 4, Table 3-2)

The cold support/storage building provides facilities for general delivery and storage, and maintenance shops necessary for general support of the Pu storage facility.

Design details are as follows:

1. Steel frame with metal skin.
2. 1500 SF shop area with overhead monorail hoist and vehicle rollup door access.
3. Two 10' x 10' offices in building.
4. Standard separate HVAC unit for offices and shop area.
5. Shop and storage areas to have 15' clear height.
6. Fork truck access to both storage and shop areas through rollup door.
7. Roof ventilators with side wall louvers provide ventilation in storage area.
8. Insulation to be provided throughout.
9. Restrooms and industrial sink.

4. Shipping and Receiving Dock (Item 5, Table 3-2)

Same as Option 1.

5. Cooling Tower System (Item 6, Table 3-2)

Same as Option 1, see location on Figure 3-7.

6. Substation (Item 7, Table 3-2)

Electrical feed to new substation will come from 151-1P main substation.

Locate new substation outside PIDAS fence adjacent to main substation 151-1P since very short distance into facility and minimal room inside PIDAS.

3.4.2 OPTION 2 - P-REACTOR ASSEMBLY AREA UPGRADE (continued)

7. Emergency Generators (Item 8, Table 3-2)

   Same as Option 1.

8. Diesel Fuel Storage (Item 9, Table 3-2)

   A 100,000 gal. C. S. Storage Tank on concrete pad.

9. Construction Laydown Area (Item 10, Table 3-2)

   20,000 SF, see location on Figure 3-7.

10. Nitrogen & Argon Storage Tank (Item 11, Table 3-2

    Carbon steel tanks provided by inert gas supplier. 200 SF concrete pad provided.

11. Exhaust Stack (Item 12, Table 3-2)

    Same as Option 1.

12. 2 - 300 Ton Chiller Systems (Item 13, Table 3-2)

    Same as Option 1.

13. Package Boiler (Item 14, Table 3-2)

    A 30,000 #/HR fuel oil fired Package Boiler including necessary feed water preparation equipment and control systems on a 2,500 SF concrete pad. Located outside PIDAS north of new substation.

14. Fire Water Supply Tank and Pumps (Item 15, Table 3-2)

    Firewater distribution system per DOE 6430.1A and 5480.7B must include DBA tank, dual pumps with redundant electrical feed and fire loop piping.

3.4.2 OPTION 2 - P-REACTOR ASSEMBLY AREA UPGRADE (continued)

Utility Hook-Ups

The utility tie-ins to existing systems and any new utility requirements are shown as in Figure 3-7.

OPTION 3 - FLOOR PLAN

FIRST LEVEL FLOOR PLAN - Figure 3-10

SECOND LEVEL FLOOR PLAN - Figure 3-11

This Figure determined to contain UNCI. See Volume IV, UNCI Supporting Documentation, issued as a separate document, NMP-PLS-940288.

The shipping packages would then be removed from the CRT and moved via a shielded fork-lift to the unpackaging area. Once unpackaged, the storage containers can proceed to accountability measurements (a separate room with a controlled atmosphere), and then onto the safety evaluation surveillance station where digital radiography provides a container and contents signature before entering the vault. All of these operations will be located on the 1st level of the building.

The new Metallurgical Laboratory area on the northeast end of the building would be converted to an abnormal package handling area.

Additional hardened space is available on the 2nd level. This space will accommodate health protection, instrument and electrical repair, a required 3rd Party (IAEA) Inspection Room, exhaust blowers, HEPA filters station, and electrical and computer rooms for the new storage facility. A freight elevator and storage container transfer elevator to access the 2nd level is also included.

The Plutonium Fabrication Facility (PuFF) and Plutonium Experimental Facility (PEF) areas and their support systems will not be dismantled in this proposal, but will be segregated from the staging and storage areas. Additional ventilation exhaust and supply equipment will be added as required to handle the ventilation of the staging and storage areas. Auxiliary equipment, supply air, offices, and change rooms will be installed in a new support building adjacent to the 235-F facility.

New shipping packages, PCVs, bagless transfer containers and any other new containers will be stored in existing class "C" building in the 247-F area.

Decontamination and Removal (D&R)

The proposed Option intends to clear a major portion of the 235-F building (including the former Neptunium Billet Line Processing area and New Met. Lab).

3.4.3 OPTION 3 - 235-F UPGRADE (continued)

Air locks and contamination barriers will be provided to isolate existing contaminated areas not intended for reuse from the proposed new facility operations. Monitoring and/or maintenance of the existing areas will be maintained.

General removal of partitioning walls, office furniture, equipment, change room fixtures, and miscellaneous storage from first floor rooms and corridors (not including storage, electrical and compressor rooms) will be required. These areas will utilize HP surveys to assure appropriate treatment. Some existing system/rooms would have to remain where necessary for security purposes or for supplying a vital support function to an existing functional area. These areas are shown on the proposed layout dwgs. Note also that partitioning and stairwells have been left in place where possible to reduce D&R costs.

The Actinide Line will require decontamination and removal of eight gloveboxes which were used in Np billet production. Removal of the billet line with its associated piping, electrical, and HVAC Systems is considered the most difficult portion of the D&R effort due to residual contamination.

The D&R work in the Neptunium Line will require careful planning and implementation to be performed safely in a cost effective manner. The adjacent hallway and its overhead piping, electrical, and duct work are also contaminated, and will require plastic suit and hut operations. Extensive rerouting, blanking and temporary services are required to D&R and install new system connectors for this option.

On the second floor, existing office, lunch room and shop areas as needed will be cleared to accommodate additional space in the hardened structure for new support services. The existing Pu-238 process support areas, main building ventilation and electrical distribution equipment will remain.

The D&R activities will generate contaminated and hazardous wastes primarily resulting from the removal of the Np line gloveboxes and the asbestos based transite in wall partitioning.

3.4.3 OPTION 3 - 235-F UPGRADE (continued)

Staging Storage Arrangement

Two first level rooms are to be used for the Vault. These areas are designated in Figure 3-10. The total available floor space for conversion to staging and storage operations on the 1st level is 16,300 SF and an additional 7,100 SF on the 2nd level.

Figure 3-10 shows the configuration of the storage racks in the vault. The racks are arranged in pairs segregated by a 1 ft. concrete wall provided for criticality control purposes. A 6 ft. access aisle will be left between each pair of storage racks. An automated guided vehicle will service each aisle to provide loading, unloading and inventory of storage containers. Existing concrete floors must be modified to accept the guide wire for these vehicles and the floor surface finished smooth.

Facility Wall Modifications

The new areas within the hardened 235 building should have the following wall and roof construction:

- 1st Floor
  - SST/SGT Unloading Dock - Steel frame/siding with lift.
  - Shipping Package Storage - 1' thick concrete walls from floor to ceiling with heavy duty lockable shield/security doors.
  - Unpackaging - 8" thick concrete on east side.
  - AM - 8" concrete wall on all sides.
  - AGV Maint. - 8" concrete walls on all sides.
  - Safety Evaluation - 8" concrete walls on all sides except gyp board on south side.
  - Control Room - Gyp. board on N, S and E.
  - Waste Mgmt. - Gyp. board on all walls.
  - APH - Use existing E, W, and S walls - Concrete wall on N.

- Contaminated Equip. Maint. - 8" concrete wall on S, all others existing.
- Vault - Add 1' thick wall on North and East, South and West. Use 1" steel plate on east wall against existing wall and use as form in place. Also add another 6-8" steel grating barrier wall outside of existing 235-F north wall.

• 2nd Floor
- Exhaust Fan Room - All walls gyp. board.
- Computer Room - All walls gyp. board.
- IER - All walls gyp. board.
- I&E Shop - gyp board all sides.
- HP - gyp board all sides.
- Elect. Room - All walls gyp. board.
- 3rd Party Inspect. - All walls gyp. board.
- Safety Eval. - Gyp. board on N, E, and W.
- 6" thick concrete roof above existing vault must have additional 1500 sq. ft. of 6"-8" security grating installed under roof.

Soft Structure (See Item 1c, Table 3-2)

Consolidation of existing and new support facilities to a new "soft structure" facility is required to support staging and storage operations in 235-F. The advantage of constructing a new soft structure for support services is that it allows the use of both the first and second level hardened structure for staging and storage operations, thereby decreasing the total capital cost to complete the upgrade. The structure will have 2 levels containing a total of 17,300 SF of floor space.

The facility would provide office space, lunch room, restrooms, change rooms, service and utility rooms, and material storage.

3.4.3 OPTION 3 - 235-F UPGRADE (continued)

Support Structures

1. Administration Building

   Existing administration buildings are available in F-Area to house approximately 50 personnel associated with the proposed Option 3 facility.

2. Guard Station

   Existing, see Figure 3-9.

3. Maintenance Facilities (Item 4, Table 3-2)

   Same as Option 1.

4. Shipping & Receiving Dock (Item 5, Table 3-2)

   Same as Option 1.

5. Cooling Tower System (Item 6, Table 3-2)

   Same as Option 1.

6. Electrical Substation (Item 7, Table 3-2)

   Same as Option 1.

7. Emergency Generator (Item 8, Table 3-2)

   Same as Option 1.

8. Diesel Fuel Storage Tank (Item 9, Table 3-2)

   10,000 gal. carbon steel tank with foundation, same as Option 1.

9. Construction Laydown Area (Item 10, Table 3-2)

   20,000 SF per Figure 3-9.

3.4.3 OPTION 3 - 235-F UPGRADE (continued)

10. Nitrogen & Argon Tanks (Item 11, Table 3-2)

Carbon steel tank supplied and leased from a vendor.

11. Exhaust Stack (Item 12, Table 3-2)

Same as Option 1.

12. 2 - 300 Ton Chiller System (Item 13, Table 3-2)

Same as Option 1.

Utility Hook-ups

Utility tie-ins are shown in Figure 3-9, attached.

Table 3-2 Facilities Data
Revision 1

Updated 7/27/94

Item No.	Facility Name	Option 1 / 2 / 3			Footprint (Sq. Ft.)	Number of Levels	Special Materials	Construction Type/Remarks
1.	Hardened Staging Building	A	U	U	21,940 Opt-1 22,230 Opt-2 17,350 Opt-3	1 1/2 1 2	SNM	Concrete
	Hardened Vault	A	U	U	3,300 Opt-1 3,600 Opt-2 4,400 Opt-3	1 1 1		
	Unhardened Support	A	A	A	16,500 Opt-1 17,775 Opt-2 17,300 Opt-3	1 2 2		Steel Frame/ Brick Veneer
2.	Administration	NA (1)	NA (1)	NA (1)				
3.	Guard Station	A	U	NA	1,500	1		Steel Frame/ Brick Veneer
4.	Cold Support Storage & Shops	U (1)	A	U (1)				
5.	Shipping & Receiving Dock	A	A	A	350	1		Concrete Dock/ Metal Roof
6.	Cooling Tower Water Facility w/pump house	A	A	A	2,000 100			Concrete slab w/metal building
7.	Substation	A	A	A	900			Concrete Pad
8.	Emergency Generators	A	A	A	900	1		Concrete Hardened Building
9.	Diesel Fuel Storage Tank	A	A	A				10,000 gal. cs Tank (Option 1 & 3) Option 2 - 100,000 gal tank

Table 3-2 Facilities Data
Revision 1
Page 2

10.	Construction Laydown Area	A	A	A	20,000			Gravel
11.	Nitrogen & Argon Tanks	A	A	A	200			1200 gal.- N2 1600 gal.- Argon Carbon Steel Tanks & Pad
12.	Exhaust Stack	A	A	A	300			Concrete Pad
13.	2- 300 Ton Chiller Systems	A	A	A	30' x 40' = 1200 sq. ft.			Concrete Pad/Metal building
14.	Package Steam Boiler-oil fired	NA	A	NA		1		
15.	Firewater Supply Tank & Pumps	NA	A	NA				

NOTES:
(1) Existing building being renovated.

A - Applicable
U - Upgrade
NA - Not Applicable

3.5.2 OPTION 2 - P-REACTOR ASSEMBLY AREA UPGRADE

The existing facility under consideration for this option has no assigned existing use or future requirement which conflict with modifying the available space (26,000 SF) to function as a Plutonium Staging and Storage Facility. The site requirement for 2,000 position and staging rate of 500 SC/yr. can be accommodated with specified equipment systems.

Existing service requirements are shown in Table 4-1 and documentation to support the capability is listed below:

- Water - Will tie-in to New Super Loop/Domestic Water System. The requirement of 16 gpm is a small percentage of total super loop capacity, and is approved should this project proceed.

- Steam - New boiler provided in scope.

- Firewater - New system provided in scope.

- Electrical Supply - 13.8 KV is obtained from the existing 151-1P substation which has a capability of 30 MVA. The maximum possible requirement is 2 MVA, which is less than 10% of total capacity.

- Chilled Water - New system provided in scope.

- Plant Air - New system provided in scope.

- Breathing Air - New system provided in scope.

- Emergency Power - New diesel powered system provided in scope.

- Cooling Water - Will tie-in to new Super Loop/ Domestic Water System. Cooling tower make-up requirement is 20 gpm. This requirement is approved should the project proceed.

- Inert Gas - Leased from Vendor.

3.5.3 Option 3 - 235-F Upgrade

The 235-F Facility has adequate hardened space available to accommodate the Staging and Storage of a 2000 position vault. However, it is currently used as a vault for Plutonium materials, and a major assumption is that in the event this option is selected these materials and any additional material, which might be stored at this location before Upgrade modification, would be removed prior to construction start. Otherwise, security measures to protect the SNM will drive the modification costs to an unacceptable levels.

Existing service requirements are shown in Table 4-1 and documentation to support this capability is listed below:

- Domestic Water - The F-Area domestic water system can supply water at 125 gpm. The facility flow requirement is only 16 gpm.

- Steam - The existing site steam system can deliver 325,000 lbs/hr. The facility total amount is 26,342 lbs/hr., which equates to only 8%.

- Firewater - F-Area fire water system uses 2 pumps rated at 2,000 gpm at 108 psi. The system also has a diesel powered backup pump rated at 1,500 gpm at 100 psi.

- Electrical - 13.8 KV is obtained from the existing 251-F substation which has a capacity of 40 MVA. The maximum possible requirement is only 2 MVA which is 5%.

- Chilled Water - New system provided in scope.

- Plant Air - Existing system will be used.

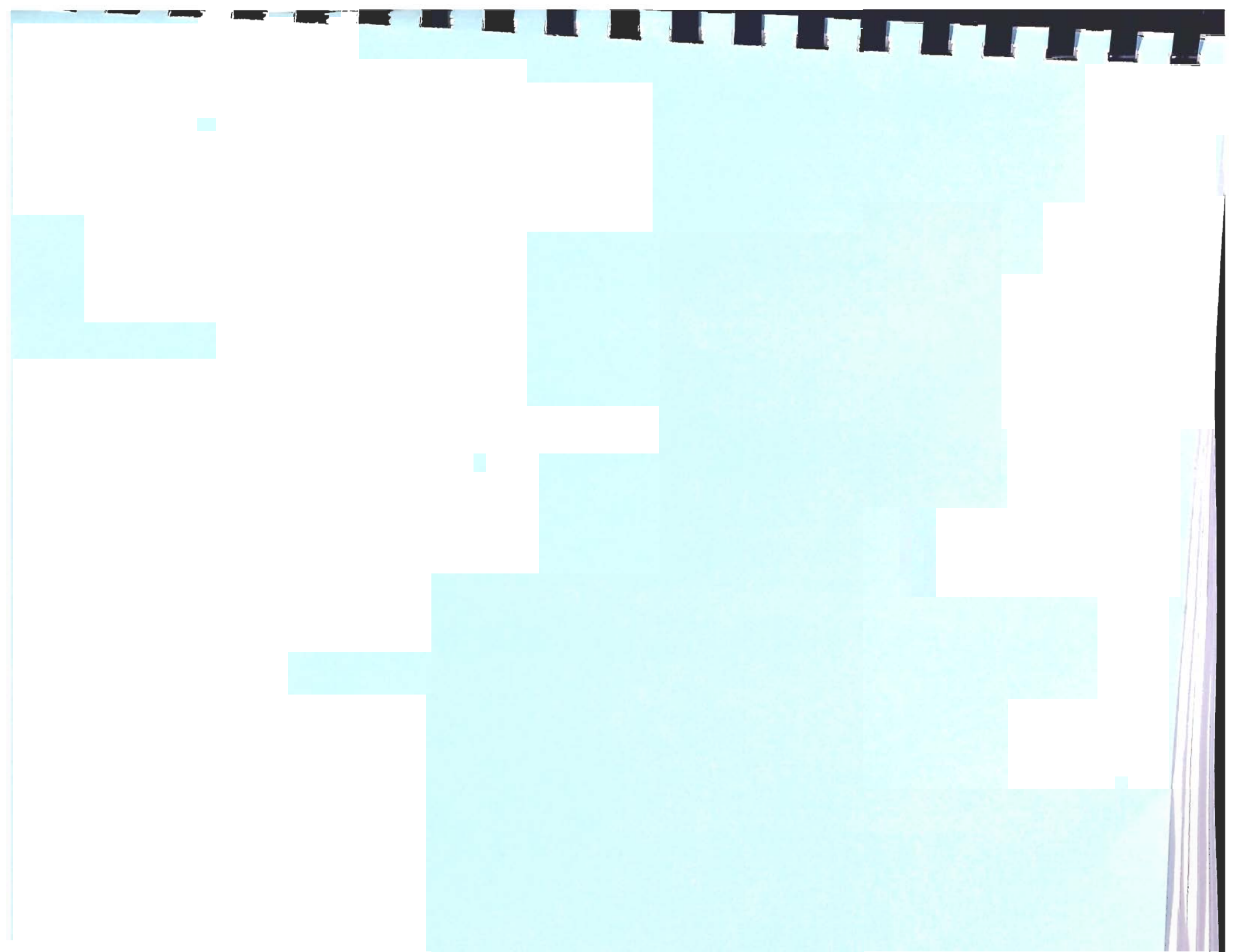
- Breathing Air - Existing system will be used.

- Emergency Power - New diesel powered system provided in scope.

3.5.3 Option 3 - 235-F Upgrade

- Cooling Water - The F-Area cooling system make-up water system can supply water at 400 gpm. The facility requirement is only 20 gpm.

- Inert gas - Leased from vendor.



4.0 RESOURCE NEEDS

4.1 MATERIALS/RESOURCES CONSUMED DURING OPERATION

4.1.1 UTILITIES CONSUMED

Table 4-1 shows the utilities consumed during normal operation. The water balance required for the proposed new facility is shown in Figure 4-1.

Table 4-1
Annual Utilities Consumed During Normal Operation

Utilities	Annual Average Consumed		
	Option 1	Option 2	Option 3
Electricity	12,000 MWh	12,000 MWh.	12,000 MWh
Diesel Fuel	6,240 gal.	300,000 gal.(2)	6,240 gal.
Steam	30,000,000 lbs.	30,000,000 lbs.(2)	30,000,000 lbs.
Process Well Water (CT Make up)	3,700,000 gal.	3,700,000 gal.	3,700,000 gal.
Domestic Water	1,702,500 gal.	5,300,000 gal.(2)	1,702,500 gal.
Fire Water(1)	30,000 gal.	30,000 gal.	30,000 gal.
Coal	1,275 tons	0(2)	1,275 tons

(1) Calculated on 1 system discharge.
(2) Option 2 requires a fuel oil fired boiler for steam.

4.1.2 CHEMICALS CONSUMED

Solid, liquid, and gaseous chemical requirements are summarized in Table 4-2. In addition to the chemicals listed in Table 4-2, the analytical laboratories require one to two thousand chemicals (mainly organic), that are used in small quantities, but only on occasions when their services are required which is expected to be rare based on current vault experience.

4.2 MATERIALS/RESOURCES CONSUMED DURING CONSTRUCTION

Table 4-3 indicates the materials/resources consumed during construction.

Table 4-3 Materials/Resources Consumed During Construction

Materials/ Resources	Total Consumption	Total Consumption	Total Consumption
Utilities	**Option 1**	**Option 2**	**Option 3**
Electricity	1.0 MWh	1.0 MWh	1.0 MWh
Water	5,280,000 Gal.	4,500,000 Gal.	4,500,000 Gal.
Solids			
Concrete	7,400 Cu. Yd.	3,000 Cu. Yd.	3,000 Cu. Yd.
Steel	630 Tons	400 Tons	400 Tons
Liquids			
Fuel	30,900 Gal.	30,900 Gal.	30,900 Gal.
Gases			
Industrial Gases[1]	88,900 Cu. Ft.	88,900 Cu. Ft.	88,900 Cu. Ft.

[1] Standard Cubic Feet measured at 14.7 psia and 60°F.

5.0 EMPLOYMENT NEEDS

5.1 EMPLOYMENT REQUIREMENTS DURING OPERATION

Staffing requirement estimates for operation of the storage facility are listed in Table 5.1. The estimates in Table 5.1 includes personnel that support the facility both directly and indirectly. The figure for operators includes additional workers required to compensate for nonproductive time.

The methodology utilized to develop the required manpower listed below was a product of Complex 21 - Plutonium Working Team in November of 1992. The detailed workup of the numbers shown below is included in Appendix B.3.

Table 5-1. Operations Staffing

Managers/Supervisors	8
Professionals	19
Technicians	39
Office and Clerical	7
Operators	35
Service Workers	22
Total Staffing	130

The labor categories listed in Table 5.1 are defined below.

Managers and Supervisors

This category includes occupations requiring administrative and managerial personnel who set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of the facility's operations. This category includes officials, managers, superintendents, and salaried supervisors.

Table 5-2

Number of Construction Craft Required by Year

Craft	Year 1	Year 2	Year 3
Carpenter	28	28	12
Electrician	6	23	24
Ironworker	17	14	5
Concrete Mason	4	2	1
Laborer	16	12	6
Pipefitter	8	25	18
Millwright	2	5	4
Operator	5	8	4
Sheet Metal	3	9	3
Sprinkler Fitter	2	5	2
Teamster	1	2	1
Other Craft	1	7	5
Total Craftworkers	93	140	85
Construction Staff (1)	14	21	13
Mgmt. & Support Staff(2)	22	32	20
Total Employment	129	193	118

Notes: (1) Construction Staff includes temporary construction facilities, construction services, and field staff.

(2) Management and support staff include all construction personnel and an allowance for DOE site personnel, field and vendor inspection services, construction management and engineering support.

6.2 EFFLUENTS

Cooling tower blowdown will be routed to the storm drain. Toxicity levels are below accepted EPA minimum values.

Steam condensate from heating will be routed to the storm drain after quenching.

Condensation from air conditioning will be recycled as cooling tower water make-up. See Figure 6-2

TABLE 6-2
Annual Effluent During Operations

Description	Quantity (gal.) (Options 1,2,&3)
CT Blowdown	1,000,000
Steam Condensate	530,000
Cooling Condensate (Recycle)	316,000

6.3 WASTES

Extensive waste processing facilities exist at SRS, therefore minimal waste processing will be done in the storage facility. See Table 6-3 for annual waste generation in the proposed new or existing upgraded facilities.

All waste leaving a Material Access Area (MAA) in the facility will be monitored prior to exiting the MAA.

The Waste Management area will process contaminated or potentially contaminated waste generated during normal storage facility operations. All other waste materials will be handled by the waste generator (shops, offices, etc.).

The small volume of waste generated during storage operations will be collected in each facility area and taken to a central waste management area for screening measurement, assaying, and preparation for shipment from the facility. The waste materials will be sorted and categorized in accordance with the WSRC S1 Manual. Each category of waste will then be transferred to the appropriate SRS waste facility for disposal.

6.3.1 WASTE TYPES

a. Solid Waste

Solid waste is any material that is to be discarded, such as used parts, consumables, refuse or sludge, packaging materials which is discarded, has served its intended use, or is a manufacturing by-product.
Solid waste from the storage facility will be in the following categories:

- Low level
- Hazardous, non-radioactive
- Hazardous/radioactive mixed waste
- TRU waste
- Sanitary (non-hazardous, non-radioactive)

1. Low Level Waste

Low level waste is a solid waste which has a radiation level less than 300 mr/hr. It may originate from sources such as:

- Packaging materials.
- Filters (HEPA and prefilters).
- Glovebox gloves.
- Protective clothing.
- Decontamination equipment and materials (HP swipes, mops, etc.).

Some of this waste may be also classified as mixed waste due to the presence of small quantities of hazardous material. This latter material will most likely result from contaminated lead shielding (from shipping packages) and from cloths and paper used to clean oil spills associated with contaminated equipment.

6.3.1 WASTE TYPES (continued)

2. Hazardous, Non-Radioactive

A hazardous waste is any waste which is either listed 40 CFR 261, exhibits one or more of the characteristics identified in the regulations, or contains a hazardous constituent. The categories are ignitable, toxic, corrosive, or reactive. Identification and characterization of a hazardous waste is accomplished by reviewing the South Carolina Hazardous Waste Management Regulations (SCHWMR) or the SRS RCRA Permit Waste Analysis Plan.

3. Hazardous/Radioactive Mixed Waste

This is a mixture of both radioactive and hazardous waste that is regulated by the Environmental Protection Agency (EPA) and South Carolina Department of Health and Environmental Control (SCDHEC). This waste is stored under the same SCDHEC permit conditions as hazardous waste (e.g., labeling, analyses, inspections, and record-keeping).

The primary source of this type of waste will result from contaminated shielding or cleaning materials. The total volume of this type of waste generated in the storage facility is expected to be small. Hazardous, radioactive mixed waste materials will be packaged in approved containers and transferred to other SRS facilities with the capabilities of disposing of the materials.

4. Transuranic (TRU) Waste

This is a solid waste which is contaminated with transuranic isotopes in concentrations greater than 10nCi/g. (per Environmental Compliance Manual 3Q, Proc. ECM 6.12) Some examples may be:

- Damaged primary containers.
- Contaminated glovebox panels, windows, gaskets.

6.3.1 WASTE TYPES (continued)

5. Sanitary Waste

This is a solid waste that does not contain a ignitable, toxic, corrosive, or reactive hazardous constituent and is not contaminated with radionuclides. Examples of this type of waste are:

- Shipping package packing materials.
- Defective and damaged equipment, instruments, packing material, etc. outside of the radiation control area.
- Office supplies.

In addition, some noncontaminated mechanical equipment and filters will routinely be disposed of as waste. These nonradioactive and nonhazardous materials will be disposed of in a manner consistent with the appropriate SRS practices.

b. Liquid Waste

1. Low Level

Aqueous solutions may contain low level waste from sources such as:

- Decontamination solutions.
- Laboratory solutions.
- Exhaust condensate.
- Fire sprinkler effluent.
- Oils and hydraulic fluids from materials handling equipment.

Decontamination solutions will be sparingly used and will most likely be absorbed by the HP swipes. A small portion of the liquid waste generated may be classified as TRU waste. Any liquid that may remain will be collected in appropriate containers and transferred to a dedicated collection tanks or containers. TRU wastes will be transferred to other SRS facilities with the capability of storing or preparing the materials for disposal.

Solutions that contain low level waste will be minimized and collected. Collection vessels for potentially unsafe concentrations of fissile solutions will be provided. These vessels will be designed with favorable geometry, poisons, or other controls.

Exhaust condensate will be collected in collection vessels, assayed, packaged, and disposed of properly depending on the matter of the effluent.

Fire sprinkler effluent will be collected in a dedicated collection tank. This effluent will be assayed for radioactivity. The effluent will be disposed of on-site consistent with current site practices.

Oils and hydraulic fluids will be collected and disposed of using established SRS practices.

2. Hazardous Wastes

Liquid wastes can be categorized as Hazardous or Mixed waste as a result of such liquids as lubricants, cleaning solvents, or lube oil being used. If hazardous materials are used in an RCA, they may be classified as mixed wastes. The storage facility will provide a collection and monitoring station for packaging and handling these waste streams.

3. TRU Waste

A small amount of liquid waste may be generated in the abnormal package handling area and be classified as TRU waste. Any liquid that may remain will be collected in appropriate containers, assayed, and transferred to dedicated collection tanks or containers. TRU wastes will be transferred to other SRS facilities with the capability of storing or preparing the materials for disposal.

4. Sanitary Waste

Domestic sewage and truck unloading area washdown water are the only components of this type waste.

6.5 WASTE HANDLING (continued)

HVAC filters will be packaged and transferred to existing solid waste handling facilities at SRS.

Safeguards monitoring of waste containers will be required before waste leaves the RCA.

6.6 WASTE HANDLING EQUIPMENT

- One 20,000 gallon double walled tank will be installed in a tank pit for collection of potentially contaminated fire sprinkler water and hose-down water. The tank will be allowed to overflow to pit area in a fire. The pit will have capacity for holdup of the total tank volume. A pump will be installed for transfer to storm sewer or to ETF line as determined by an on-line alpha monitor (OLAM). These instruments are presently used in area storm sewers. Tank agitation is by pump recirculation. The tank will be vented through a demister and a HEPA filter.

- A carbon dioxide pellet cleaning station will be installed in a central location with lines supplying pellets to gloveboxes in Abnormal Package Handling and a cleaning station in the Waste Management Area. The CO_2 pellets sublime on contact with the surface being cleaned, carrying contaminated particulates to HEPA filters located in the exhaust ventilation system.

- Solid waste leaving the storage facility must be monitored for safeguards. Assume that a Canberra drum monitor, or equivalent, and a drum neutron monitor for 55 gal. drums (or smaller packages) will be used. Neutron monitoring is required for potentially shielded SNM. Allow approximately 40 SF floor space in the Waste Management Area for each of these instruments.

- A waste compactor is included in the equipment list, but may not be needed for this facility due to the low volume of LL Solid Waste to be handled.

- Various miscellaneous equipment items including hand monitors, lift trucks, work tables, drum handlers, etc. will be provided to sort, handle, and package waste.

6.7 POST-TREATMENT WASTE

Waste generated during operation of the storage facility is presented in the pre-treatment column in Table 6-6. Much of this waste will be treated on-site with a corresponding reduction in final waste volume. Post-treatment volume estimates are presented in the Post-Treatment Column of Table 6-6.

Hazardous solids and radioactive hazardous mixed waste will not receive additional treatment and will be stored on-site. Transuranic waste will be stored on-site awaiting final disposition at a permanent storage facility.

Table 6-6
Pre/Post Treatment Waste Estimates
Options 1, 2, & 3

7/28/94

Waste Category	Pre-Treatment[1] Annual Volume	Post-Treatment[2] Annual Volume	Disposition
Sanitary Solid	39,667 ft^3	735 yd^3 (assume 50%)	Recycle maximum possible and ship balance to landfill.
Sanitary Liquid	1,702,500 gal.	4,860 gal. Water/Sludge ratio of 350:1.	Wastewater treated. Sludge to land applicator.
Hazardous Solid	47 ft^3	47 ft^3 (1.7 yd^3)	No volume reduction. Stored in vaults on-site.
Hazardous Liquid	50 gal.	0.25 gal. volume reduction.	Incinerated at CIF. 200:1
Low Level Solid	245 ft^3	61.25 ft^3 site. 4:1 volume reduction.	Compacted and stored on-
Low Level Liquid	20 gal.	0.226 gal. wastewater/sludge ratio	Treated at ETF. 100:1 Sludge shipped to tank farm.
Radioactive Hazardous Mixed Solid	2 ft^3	2 ft^3 (0.07 yd^3)	No volume reduction. Stored on-site.
Transuranic	10 ft^3	10 ft^3 (0.37 yd^3)	Stored on-site. Ship to WIPP at a later date.

Notes:
1. Pre-Treatment volumes are based on 130 personnel or Floor areas as discussed in Section 6.4.
2. Post-Treatment volumes equal final waste volume following treatment at SRS facilities. (See Table 6-3)

6.8 WASTE AND EMISSIONS GENERATED DURING CONSTRUCTION

This section presents the significant gaseous emissions and waste generated during construction of the storage facility. The estimates provided are for new facility construction, but are not expected to vary widely for existing facility upgrade.

6.8.1 EMISSIONS

Air pollutants are emitted during construction of the storage facility. The principal sources of such emissions are: fugitive dust from land clearing, site preparation, excavation, and other construction activities, exhaust from construction equipment; and vehicles delivering materials and carrying construction workers. The peak annual emissions generated during construction are shown in Table 6-4.

6.8.2 WASTES

The solid and liquid wastes generated during construction include concrete and steel construction waste materials and sanitary wastewater. The steel construction waste material will be recycled as scrap material before completing construction. No radioactive or mixed wastes are generated during construction. The total quantities of solid and liquid waste generated during construction are shown in Table 6-5. D&R waste of existing facilities and equipment is not included in Table 6-5. However, the Cost Estimate provides estimated bulk quantities of existing materials to be removed and handled as wastes.

Table 6-4 Emissions During Peak Construction Year

Chemical	Emission (Tons)
Sulfur Dioxide	0.1
Oxides of Nitrogen	0.8
Volatile Organic Compounds	0.2
Carbon Monoxide	4.0
Particulate Matter (10 microns or smaller)	1.2
Total Suspended Particulates	2.5

6.8.2 WASTES (continued)

Table 6-5 Total Wastes Generated During Construction

Waste Category	Quantity
Concrete and Paving	90 cu. yd.
Steel	9 ton
Water	3,986,000 gallons
Hazardous Waste	2.0 cu. yd. *

*Includes Liquid Wastes (Lube oils, hydraulic fluids and cleaning solvents.

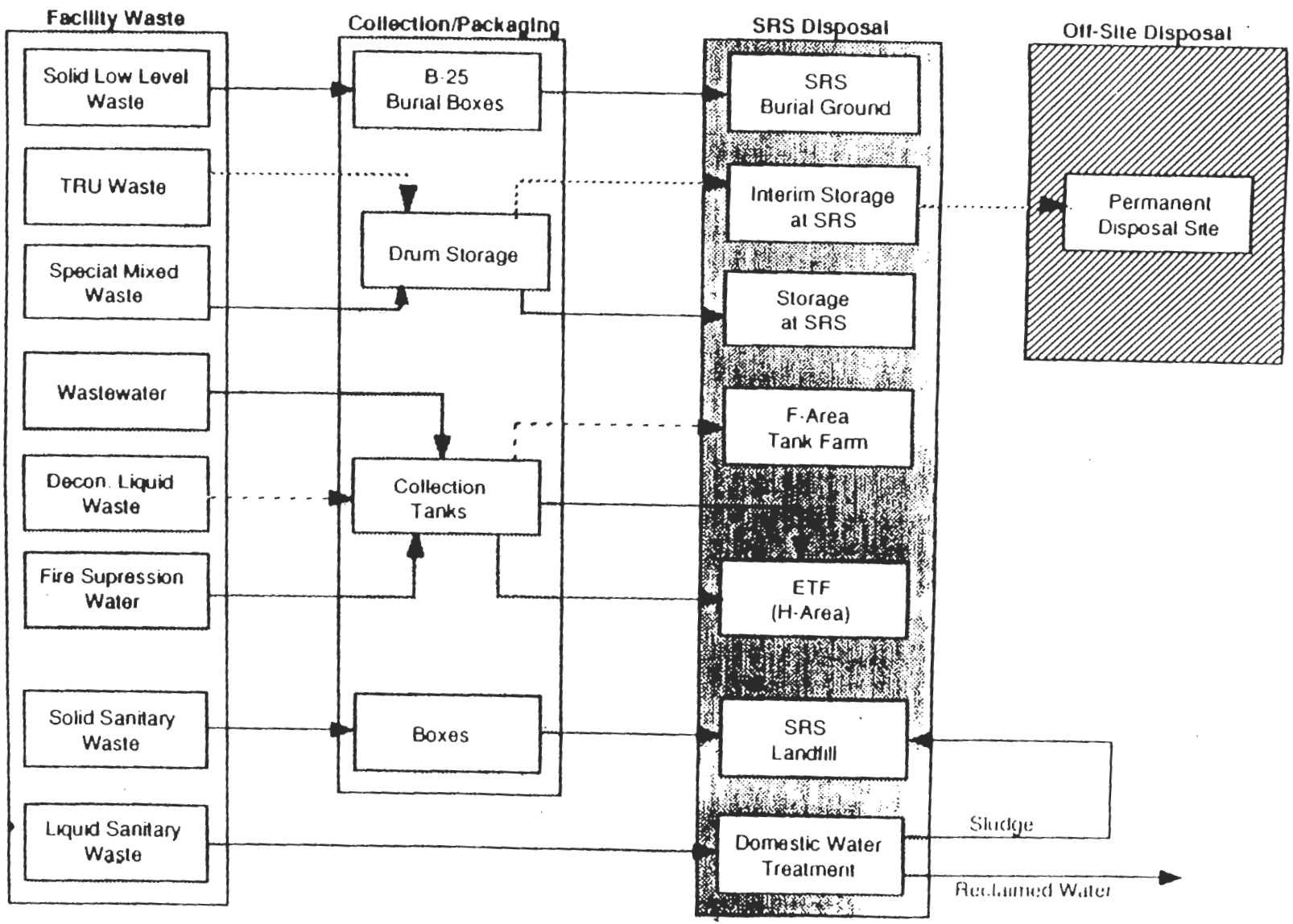
7.0 INTRA-SITE TRANSPORTATION OF RADIOLOGICAL/HAZARDOUS MATERIALS

Intra-site transportation of radiological and hazardous materials for the Pu Storage Facility are as follows: The facility receives and ships Pu components using SSTs. The storage container packages are transported between vault storage and staging via a hardened internal corridor. Primary containers which require surveillance are returned to staging where a limited capability exists for this purpose.

Waste products are transported to a common waste management area in the staging building. The solid wastes are packaged as shown in Figure 7-1 and transported to existing Waste Management Facilities by truck. TRU waste is packaged in special purpose drums for on-site storage or loaded in TRU Package Transports (TRUPACTSs) for off-site shipment. Mixed wastes are loaded in drums for storage on-site in long-term waste storage cells.

Liquid wastes are sent to collection tanks which will be batch transferred to a disposal facility on site such as ETF or the F-Area Tank Farm. Liquid sanitary waste will be piped to existing F-Area domestic water treatment.

FIGURE 7-1
PROPOSED STORAGE FACILITY
WASTE MANAGEMENT SYSTEM



8.0 ACCIDENT SCENARIOS, RISK ASSESSMENT, AND SOURCE TERM REPORT

Guidance on potential accident scenarios, risk assessment, and source term information is included in Document NMP-SDG-94-0087, dated July 27, 1994.

This document is included in Volume IV, UNCI Supporting Documentation Report.